

UNITED STATES OF AMERICA:
WAR DEPARTMENT.

MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

APRIL, 1886.

PREPARED UNDER THE DIRECTION OF
BRIG. & BVT. MAJ. GEN'L W. B. HAZEN,
CHIEF SIGNAL OFFICER OF THE ARMY,

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SIGNAL OFFICE.
1886.

List of merchant marine steam and sailing vessels from which International Simultaneous Meteorological reports were received at the Office of the Chief Signal Officer, U. S. Army, Washington, D. C., in time to be used in the preparation of the Weather Review for the month of April, 1886.

Name of vessel.	Captain.	Name of vessel.	Captain.	Name of vessel.	Captain.
Allen Line.		National Line.		Miscellaneous.	
Br. s. s. <i>Albatross</i>	Capt. J. Scott.	Br. s. s. <i>Denmark</i>	Capt. Geo. Cochran.	Br. s. s. <i>Albatross</i>	Capt. Jno. Temple.
Br. s. s. <i>Albatross</i>	Wm. Richardson.	Br. s. s. <i>Denmark</i>	R. W. Grace.	Br. s. s. <i>Albatross</i>	Ch. Off. Ensl. Towns.
Br. s. s. <i>Albatross</i>	C. E. LeGallie.	Br. s. s. <i>Denmark</i>	T. P. Hovey.	Br. s. s. <i>Albatross</i>	Capt. T. Alkenhead.
Br. s. s. <i>Albatross</i>	John Brown.	Br. s. s. <i>Denmark</i>	A. J. Jeffrey.	Br. s. s. <i>Albatross</i>	H. Nelson.
Br. s. s. <i>Albatross</i>	R. Corbitt.	Br. s. s. <i>Denmark</i>	John Miligan.	Br. s. s. <i>Albatross</i>	S. A. Voock.
Br. s. s. <i>Albatross</i>	Alex. McDougal.	Br. s. s. <i>Denmark</i>	Wm. Tyson.	Br. s. s. <i>Albatross</i>	S. K. Chasler.
Br. s. s. <i>Albatross</i>	P. Moore.	Br. s. s. <i>Denmark</i>	James Sargent.	Br. s. s. <i>Albatross</i>	W. H. Bennett.
Amoy Line.		Navigators General Service.		Br. s. s. <i>Albatross</i>	John W. Bennett.
Br. s. s. <i>Amoy</i>	Geo. Burton.	Br. s. s. <i>Amoy</i>	Domenico Viola.	Br. s. s. <i>Albatross</i>	John W. Bennett.
Br. s. s. <i>Amoy</i>	Samuel Noyes.	Br. s. s. <i>Amoy</i>	C. M. Fairbank.	Br. s. s. <i>Albatross</i>	D. F. de Bengon.
Br. s. s. <i>Amoy</i>	Geo. H. Dodge.	Br. s. s. <i>Amoy</i>	J. W. Reynolds.	Br. s. s. <i>Albatross</i>	R. W. Hick.
Br. s. s. <i>Amoy</i>	P. Ungar.	Br. s. s. <i>Amoy</i>	G. Meyer.	Br. s. s. <i>Albatross</i>	A. de Mungia.
Amoy Line.		Br. s. s. <i>Amoy</i>	C. Pohl.	Br. s. s. <i>Albatross</i>	C. H. Backfill.
Br. s. s. <i>Amoy</i>	John McKeown.	Br. s. s. <i>Amoy</i>	H. Heimer.	Br. s. s. <i>Albatross</i>	Marion F. Wiley.
Br. s. s. <i>Amoy</i>	Alex. McRitchie.	Br. s. s. <i>Amoy</i>	H. Richter.	Br. s. s. <i>Albatross</i>	Thomas Kirby.
Br. s. s. <i>Amoy</i>	A. Campbell.	Br. s. s. <i>Amoy</i>	W. Willigerod.	Br. s. s. <i>Albatross</i>	John Jenkins.
Br. s. s. <i>Amoy</i>	R. T. Garvie.	Br. s. s. <i>Amoy</i>	R. Ring.	Br. s. s. <i>Albatross</i>	Moore Perry.
Br. s. s. <i>Amoy</i>	Hugh Young.	Br. s. s. <i>Amoy</i>	F. Pfeiffer.	Br. s. s. <i>Albatross</i>	J. Vleck.
Br. s. s. <i>Amoy</i>	J. Halden.	Br. s. s. <i>Amoy</i>	H. Baur.	Br. s. s. <i>Albatross</i>	R. S. Thompson.
Br. s. s. <i>Amoy</i>	James Brown.	Br. s. s. <i>Amoy</i>	H. Winter.	Br. s. s. <i>Albatross</i>	James Adams.
Amoy Line.		Br. s. s. <i>Amoy</i>	C. Thelen.	Br. s. s. <i>Albatross</i>	Thos. Harrison.
Br. s. s. <i>Amoy</i>	R. F. Stannard.	Br. s. s. <i>Amoy</i>	H. Christensen.	Br. s. s. <i>Albatross</i>	C. E. Cook.
Amoy Line.		Br. s. s. <i>Amoy</i>	C. Wiegand.	Br. s. s. <i>Albatross</i>	L. Murray.
Br. s. s. <i>Amoy</i>	J. W. Simon.	Br. s. s. <i>Amoy</i>	Richard Rasmus.	Br. s. s. <i>Albatross</i>	Jas. Price.
Br. s. s. <i>Amoy</i>	H. B. Hughes.	Br. s. s. <i>Amoy</i>	H. Bruns.	Br. s. s. <i>Albatross</i>	W. G. Shackford.
Br. s. s. <i>Amoy</i>	T. Anagnost.	Br. s. s. <i>Amoy</i>	W. E. Parnis.	Br. s. s. <i>Albatross</i>	H. Parrell.
Br. s. s. <i>Amoy</i>	David Williams.	Br. s. s. <i>Amoy</i>	K. S. Nickerson.	Br. s. s. <i>Albatross</i>	G. S. Murray.
Amoy Line.		Br. s. s. <i>Amoy</i>	J. W. Catharine.	Br. s. s. <i>Albatross</i>	J. G. Perry.
Br. s. s. <i>Amoy</i>	Thomas Barley.	Br. s. s. <i>Amoy</i>	H. G. Morse.	Br. s. s. <i>Albatross</i>	W. H. F. Hains.
Br. s. s. <i>Amoy</i>	C. Journeil.	Br. s. s. <i>Amoy</i>	Frank Stevens.	Br. s. s. <i>Albatross</i>	D. Williams.
Br. s. s. <i>Amoy</i>	J. L. Chaplain.	Br. s. s. <i>Amoy</i>	Frederick.	Br. s. s. <i>Albatross</i>	Sam. Brooks.
Amoy Line.		Br. s. s. <i>Amoy</i>	E. Polmann.	Br. s. s. <i>Albatross</i>	G. Burton.
Br. s. s. <i>Amoy</i>	W. Fitt.	Br. s. s. <i>Amoy</i>	John N. Ingalls.	Br. s. s. <i>Albatross</i>	W. A. Bennett.
Br. s. s. <i>Amoy</i>	T. L. Weiss.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	H. Perry.
Amoy Line.		Br. s. s. <i>Amoy</i>	R. H. S. S. S.	Br. s. s. <i>Albatross</i>	R. B. Quinn.
Br. s. s. <i>Amoy</i>	H. R. Freeman.	Br. s. s. <i>Amoy</i>	L. Dexter.	Br. s. s. <i>Albatross</i>	J. W. Reynolds.
Br. s. s. <i>Amoy</i>	K. V. Ganger.	Br. s. s. <i>Amoy</i>	G. G. Berry.	Br. s. s. <i>Albatross</i>	F. S. Land.
Amoy Line.		Br. s. s. <i>Amoy</i>	Chas. C. Lima.	Br. s. s. <i>Albatross</i>	H. Condon.
Br. s. s. <i>Amoy</i>	W. H. B. Hains.	Br. s. s. <i>Amoy</i>	W. B. Sady.	Br. s. s. <i>Albatross</i>	First Watkins.
Br. s. s. <i>Amoy</i>	T. Cook.	Br. s. s. <i>Amoy</i>	Thos. Chapman.	Br. s. s. <i>Albatross</i>	A. Bennett.
Br. s. s. <i>Amoy</i>	B. Wadsworth.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	John Deane.
Br. s. s. <i>Amoy</i>	H. McKay.	Br. s. s. <i>Amoy</i>	Thos. Chapman.	Br. s. s. <i>Albatross</i>	A. Lewis.
Amoy Line.		Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	Benj. Glend.
Br. s. s. <i>Amoy</i>	G. Frank.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	Chas. Lima.
Br. s. s. <i>Amoy</i>	O. Winkler.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	W. H. Bennett.
Amoy Line.		Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	C. Chas.
Br. s. s. <i>Amoy</i>	W. T. Shumaker.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	T. Cook.
Br. s. s. <i>Amoy</i>	M. F. Lund.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	W. Willigerod.
Amoy Line.		Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	H. Voss.
Br. s. s. <i>Amoy</i>	E. Santell.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	A. J. Griffin.
Br. s. s. <i>Amoy</i>	P. O'Hartigan.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	J. Douglas.
Br. s. s. <i>Amoy</i>	G. de Krenbich.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	W. G. Shackford.
Amoy Line.		Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	N. E. Nickels.
Br. s. s. <i>Amoy</i>	Ch. Off. Wm. B. Baw.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	Jas. Brown.
Amoy Line.		Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	F. H. Bonjer.
Br. s. s. <i>Amoy</i>	Capt. J. Price.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	R. Weyer.
Br. s. s. <i>Amoy</i>	John Douglas.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	F. J. Irving.
Br. s. s. <i>Amoy</i>	Edward Bentley.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	A. Hyde.
Br. s. s. <i>Amoy</i>	C. L. Rigby.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	J. C. Johnson.
Amoy Line.		Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	G. Backer.
Br. s. s. <i>Amoy</i>	G. Ransing.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	A. McKay.
Br. s. s. <i>Amoy</i>	R. Karlos.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	M. de Janssen.
Br. s. s. <i>Amoy</i>	W. Kuhlmann.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	J. Milligan.
Br. s. s. <i>Amoy</i>	H. F. Schwanen.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	G. J. Vis.
Br. s. s. <i>Amoy</i>	B. Voss.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	J. Unterweg.
Br. s. s. <i>Amoy</i>	O. Pusch.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	B. Bentley.
Br. s. s. <i>Amoy</i>	H. Vogelmann.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	W. G. Handie.
Br. s. s. <i>Amoy</i>	A. Albert.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	C. Lohr.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	C. Helich.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	E. Knipf.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Amoy Line.		Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	Francis S. Land.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	Frederick Watkins.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	A. W. Lewis.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Amoy Line.		Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	John Lusk.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Amoy Line.		Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	Thos. Sawyer.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	Samuel Clarke.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Amoy Line.		Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	M. Fitt.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Amoy Line.		Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	M. B. Crowell.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	A. C. Burrows.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Amoy Line.		Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	William Benson.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Amoy Line.		Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	F. Bouchette.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	W. P. Couch.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	Joseph Gibson.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	Jas. McAulay.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Amoy Line.		Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	John Harrison.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	W. S. Morgan.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	R. J. W. Belshaw.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	E. Paxon.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Amoy Line.		Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	
Br. s. s. <i>Amoy</i>	Geo. W. Mason.	Br. s. s. <i>Amoy</i>	W. G. Shackford.	Br. s. s. <i>Albatross</i>	

MONTHLY WEATHER REVIEW.

VOL. XIV.

WASHINGTON CITY, APRIL, 1886.

No. 4.

INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States and Canada during April, 1886, based upon the reports from the regular and voluntary observers of the Signal Service and from co-operating state weather services.

Descriptions of the storms which occurred over the north Atlantic Ocean during the month are also given, and their approximate paths shown on chart i. In tracing the centres of the paths of these storms data from the reports of one hundred and eighty-eight vessels have been used.

Over the Atlantic, high pressures and fair weather prevailed until the 20th, followed by low pressures and stormy weather continuing to the close of the month. Pressures below 29.00 were reported on the 1st, 17th, and 30th.

Icebergs and field ice drifted into the Atlantic in large quantities after the 15th, reaching southward to the latitude of N. 42°, and one iceberg was observed as far eastward as W. 30°; this is the most eastern limit of icebergs ever reported to this office during the month of April.

The most violent storm of the month was the hurricane of March 31st to April 1st, of which very full reports, furnished by ship captains, will be found under the heading "North Atlantic storms."

Seven areas of low pressure have been traced over the United States during April, 1886, the average number for April during the last thirteen years being 10.6; the largest number for April in the above period is eighteen, in 1879, and the least is seven, in 1881 and 1886. Low area number ii for April, 1886, was the severest storm of the month. It was especially severe in the Lake region and on the New England and middle Atlantic coasts, and caused much damage to shipping and other interests. The tides along the New England and middle Atlantic coasts were unusually high during the prevalence of this storm.

The high mean pressure over New England and the middle Atlantic states, as shown on chart ii, is worthy of note, the departures above the normal in these districts ranging from .20 to .26.

The mean temperature is above the normal over the northern districts east of the Rocky Mountains, the departures being greatest in the extreme northwest, where they range from 6° to 8°. The temperature is below the normal over the southern districts, the departures being most marked in Florida.

The precipitation is in excess of the normal over the middle Atlantic states, Lake region, and generally in all districts west of the Mississippi River, with the exception of the west Gulf states and north Pacific coast. The most marked deficiencies occurred in the south Atlantic states and Tennessee, and the greatest excess occurred in the extreme northwest and middle Pacific coast region.

The destructive freshets in the south Atlantic and east Gulf

states at the beginning of the month were due to the heavy rains which fell during the latter part of March, there being a marked deficiency in the precipitation for April in that region.

The tornado which occurred in Minnesota on the 14th during the prevalence of low area iv was unusually destructive to life and property.

Chart vi exhibits curves representing the results of simultaneous observations of the electrometer at certain stations, as prepared by Prof. T. C. Mendenhall, Office of the Chief Signal Officer. Under the heading "Atmospheric electricity," will be found notes, by Professor Mendenhall, relating to the chart, and to the subject of observations of the electrometer.

In the preparation of this REVIEW the following data, received up to May 20, 1886, have been used, viz., the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and thirty-three Signal Service stations and twenty-one Canadian stations, as telegraphed to this office; one hundred and sixty-three monthly journals and one hundred and sixty monthly means from the former, and twenty-one monthly means from the latter; two hundred and ninety-five monthly registers from voluntary observers; sixty-four monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs furnished by the publishers of "The New York Maritime Register;" monthly weather reports from the New England Meteorological Society, and from the local weather services of Alabama, Colorado, Georgia, Illinois, Indiana, Minnesota, Missouri, Nebraska, Ohio, and Tennessee, and of the Central Pacific Railway Company; trustworthy newspaper extracts, and special reports.

ATMOSPHERIC PRESSURE.

[Expressed in inches and hundredths.]

The mean atmospheric pressure for April, 1886, determined from the tri-daily telegraphic observations of the Signal Service, is shown by isobarometric lines on chart ii.

The mean pressure is greatest over New England and adjacent portions of the Canadian Provinces, lower lake region, and the middle Atlantic states, the highest monthly barometric means (30.13) occurring at Albany, New York; New London, Connecticut; and Sydney, Nova Scotia. Westward and southwestward of the districts named the mean pressure decreases until reaching the Pacific coast region, where a slight rise in the barometric means is noted. The area of minimum pressure occupies the middle and southern Rocky Mountain districts, where the means are generally below 29.9, there being a small area comprising portions of Arizona and New Mexico enclosed by the isobar for 29.85. The lowest barometric mean reported is 29.83 for Fort Thomas, Arizona.

A comparison of the charts exhibiting the mean pressure for the months of March and April, 1886, shows that at stations along the Mississippi from the Gulf to Minnesota the means either coincide or differ but slightly. To the eastward of the Mississippi a marked increase in the mean pressure for April

occurs, while to the westward a decrease nearly as great is shown. The most marked increase occurs over the Canadian Maritime Provinces where, at some stations, it exceeds .30. To the westward of the Mississippi the pressure is, at all stations, lower than for the preceding month, the difference being greatest in the central Rocky Mountain region, where it ranges from .15 to .22.

The departures from the normal pressure at the various Signal Service stations are given in the tables of miscellaneous meteorological data, and on chart iv they are shown by lines connecting stations of equal departure. From this chart it will be seen that the normal line extends from the northern boundary of the United States at the ninety-second meridian in a south-southwesterly direction, striking the Mexican border at about 10° west of the above-named meridian. To the eastward of the line mentioned the pressure is above the normal, and to the westward it is below. The deficiencies are not marked (nowhere exceeding .07), while over New England and the Maritime Provinces the excess is unusually large, amounting to .20 or more at the most easterly stations.

BAROMETRIC RANGES.

The monthly barometric ranges at the various Signal Service stations are also shown in the tables of miscellaneous data; they are greatest in the Lake region and on the middle Atlantic coast, and least in New Mexico, southwestern Texas, Arizona, and southern California.

The following are some of the extreme monthly ranges:

Greatest.		Least.	
	Inches.		Inches.
Mackinaw City, Michigan	1.42	Fort Thomas, Arizona	0.38
Alpena, Michigan	1.34	Fort Grant, Arizona	0.38
Escanaba, Michigan	1.19	Fort Stanton, New Mexico	0.42
Philadelphia, Pennsylvania	1.18	Fort Apache, Arizona	0.45
Fort Huron, Michigan	1.14	Fort Davis, Texas	0.45
Baltimore, Maryland	1.14	San Diego, California	0.45
Atlantic City, New Jersey	1.13	Los Angeles, California	0.46
Sandy Hook, New Jersey	1.13	Santa Fé, New Mexico	0.50
Block Island, Rhode Island	1.13	El Paso, Texas	0.51

AREAS OF HIGH PRESSURE.

Eight areas of high pressure appeared within the limits of the stations of observation during the month of April, 1886. Four of these areas reached the Atlantic and were attended by marked changes in the atmospheric conditions within the districts over which they passed; one appeared on the north Pacific coast and was traced eastward to the Lake region and thence to the south Atlantic coast; the fifth, and last, area observed remained almost stationary over Oregon and Washington Territory from the 23d to the 27th, when it disappeared by a gradual decrease of pressure without apparent movement of translation. One area approached from the region north of the Saint Lawrence Valley and passed over the north Atlantic, after which it was apparently re-enforced and moved southward and thence westward over New England and the Lake region before it finally disappeared to the eastward of the middle Atlantic coast.

The following are detailed descriptions of the movements of each of the above areas, with a brief account of the weather changes attending each:

I.—This area extended over the upper Missouri valley on the first day of the month, the pressure being greatest far to the north of Dakota. A severe storm was at that time central north of Lake Huron, the pressure at Mackinaw City, Michigan, being 29.05, while in Manitoba it was 30.32. This distribution of pressure continued until the 3d, the centre of the high-pressure area remaining north of Minnesota, while the storm over the Lake region passed rapidly to the northeast. The barometer had risen to 30.53 in Manitoba, where the temperature was 10° below zero on the morning of the 3d. The winds were northerly over the central valleys and the Lake region, and a depression was forming in the Rio Grande Valley—or this high area had apparently forced a depression from the northern plateau southeastward until it reached the

west Gulf states. This high area moved directly south during the 4th, 5th, 6th, and 7th, and on the last-named date, at 7 a. m., it had reached western Missouri. During the southerly movement the storm previously referred to developed and passed along the Atlantic coast to the northeast, and on the 7th it had reached the middle Atlantic coast, and was, therefore, immediately to the east of the high area. These conditions were followed by an easterly movement of the high and low areas, both inclining to the northeast, and the high area apparently followed the low. The former was central in Tennessee on the 8th, in Virginia on the 9th, and it had disappeared to the east over the Atlantic by the morning of the 10th.

II.—On the 9th, the date of disappearance of the high area previously described, this area was observed to the north of Dakota. It was at no time within the limits of the stations of observation, but passed eastward north of the Lake region during the 10th and 11th. On the morning of the 11th this area of high pressure extended over the northeastern districts, it being central near Quebec, Province of Quebec, where the pressure was 30.62. The barometer continued to rise within the limits of this area as it passed over northern New England, and the maximum pressure was observed at stations in Nova Scotia on the 12th. The reports indicate that there was a gradual increase of pressure within this high area from the 9th, when first observed north of Minnesota, until it disappeared to the east of New England. During the transit of this high area the temperature was below freezing at the northern stations near the track of the centre of greatest pressure, the lowest temperature, —19°, being observed at Rockliffe, Province of Ontario, on the morning of the 11th.

III.—The storm which developed on the central Pacific coast on the 10th moved slowly northeast and was apparently forced to the north by this area of high pressure, which extended over the greater portion of the eastern half of the continent on the 13th. It was central north of the Lake region and moved eastward to the north Atlantic coast as the storm from the Pacific coast advanced over Dakota. During the 15th it moved southward with increasing pressure, causing strong northeast winds along the Atlantic coast as far south as Florida. These conditions continued during the 16th and 17th, but there was a slow westerly movement of the high area observed. The centre passed to the east of the coast line on the 18th, and was in New York state at 7 a. m. of that date. The 3 and 10 p. m. reports of the 18th placed the centres of this area in western New York and near Mackinaw City, Michigan, respectively. The northerly movement continued until the 3 p. m. report of the 19th, when its course changed, first to the south, and finally to the east, passing over the Lake region, and thence to the Atlantic coast, attended by decreasing pressure. Traces of this high area were observed in the eastern districts until the 22d—nine days after its first appearance to the north of Lake Superior. The unusual movement to the northwest after having reached the Atlantic coast may be considered in connection with the unusual course of the area of low pressure which disappeared to the north of Dakota.

IV.—This area of high pressure was first observed on the north Pacific coast on the 18th. The high area previously referred to extended over the eastern half of the continent, and a depression was forming in Arizona while a trough of low pressure extended northward from the Rocky Mountain region to Dakota. This high area passed directly eastward to the Lake region and extended southward over the central valleys, leaving the barometer low over the southern plateau region. It extended eastward and formed a part of high area number iii on the 21st and 22d, and disappeared as a clearly defined high area on the latter date. It was followed by a storm from the plateau region which probably resulted from the depression to the south of Arizona.

V.—This area of high pressure did not pass to the eastward of the Rocky Mountains. It appeared on the north Pacific coast on the 21st, and the pressure remained high in that

region until the 26th when it fell below the normal. On the last day of the month a sixth area of high pressure appeared in this region, when the stations to the south in the Rio Grande and Colorado valleys indicated the presence of a low area over northern Mexico.

AREAS OF LOW PRESSURE.

Chart number i exhibits tracks of the centres of the areas of low pressure as traced from the tri-daily telegraphic reports. It will be seen from this chart that seven areas of low pressure have been traced. The most marked feature of the chart, when compared with previous storm-track charts, is that the storms of this month had their origin in the Rocky Mountain regions, or to the westward, and only one of the storms traced reached the Atlantic coast. They moved with a low average velocity and their general direction was more to the north than the general course of areas of low pressure for the month of April.

The following table shows the latitude and longitude in which each area was first and last observed, and the average rate of movement in miles per hour:

Low areas.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
No. I	42 00	114 00	95 00	65 00	25.0
II	40 00	102 00	44 00	82 00	15.0
III	38 00	125 00	54 00	100 00	16.0
IV	40 00	105 00	43 00	82 00	30.0
V	36 00	103 00	54 00	92 00	20.0
VI	40 00	99 00	42 00	91 00	12.0

Mean hourly velocity, 19.7 miles.

I.—This storm was traced from the Southwest over the Ohio Valley to a point north of Michigan, in the March REVIEW. On the morning of April 1st it was central near the east portion of Lake Superior, the barometer being unusually low at the centre and severe gales were reported from the lake stations. This storm moved rapidly to the northeast during the 1st, and was followed by a high area and cold wave from the region north of Minnesota and Dakota. The pressure increased within the storm when it passed from the Lake region, and it apparently lost energy, although strong westerly winds occurred at a number of the northeastern stations on the 2d.

II.—The 10 p. m. report of the 1st indicated the presence of an area of low pressure over the middle plateau region. The succeeding reports of the 2d and 3d serve to trace this disturbance southeastward to the Rio Grande Valley, where it was clearly defined as a storm which would probably pass over the Atlantic coast districts with increasing energy. The centre of this storm was near the twenty-fifth parallel on the morning of the 4th. It moved rapidly over the Gulf on the 4th, passing south of New Orleans, and thence followed the Atlantic coast, passing inland over Georgia, central North Carolina, and eastern Virginia, reaching its maximum energy on the middle Atlantic coast. This storm, after passing to the east of the Gulf coast, was followed by a severe "norther" in Texas, the wind reaching a velocity of forty-six miles per hour at Indianola on the 4th. The pressure decreased rapidly at the centre of this disturbance during the northeasterly movement over the south Atlantic states, attended by very heavy rains and dangerous gales, but the storm did not attain its maximum energy until the centre was near Philadelphia, Pennsylvania, during the afternoon of the 6th. The wind reached a maximum velocity of sixty miles per hour from the east at Sandy Hook, New Jersey, when the centre was near that station. This storm remained almost stationary in New York state during the 7th, apparently moving westward and then slightly to the south before moving eastward along the southern New England coast. It was last located as central south of Long Island at midnight of the 7th, but the succeeding reports indicated that the northeast movement continued after the centre passed off

the coast and it was probably central east of Nova Scotia at the 10 p. m. report of the 8th.

The following notes relative to this storm are from the reports of Signal Service observers:

Detroit, Michigan: a furious northeasterly gale and heavy snow storm occurred on the 6th, completely blockading the streets and filling railroad cuts in this vicinity. The storm was unprecedented in fierceness and amount of snowfall.

Port Huron, Michigan: the gale of the 6th was accompanied by a heavy snow storm, the heaviest of the season. The high wind caused the snow to drift so badly that travel on the streets was very difficult. All trains were late; schools were closed and business was suspended.

Cleveland, Ohio: a heavy snow storm, accompanied by high winds, occurred on the 5th and 6th.

Toledo, Ohio: on the morning of the 5th the worst snow storm of the season set in, and before daylight nearly seven inches of snow had fallen. The snow was accompanied by a high wind which caused it to drift and rendered the streets nearly impassable. Business was practically suspended and the streets were entirely deserted.

Erie, Pennsylvania: a storm, reaching a maximum velocity of thirty-six miles, prevailed during the night of the 5th and morning of the 6th. The wind, rain, and snow combined made the storm one of the severest experienced here for many years. Travel was greatly impeded, telegraph poles and large trees being thrown down.

Pittsburg, Pennsylvania: the storm which set in on the 5th and continued through the 6th was the worst storm of the winter. Rain and snow fell without interruption for twenty-four hours. The river rose at all points and a flood was apprehended. Railroad travel was impeded on nearly all lines entering the city. The heavy rains loosened the earth which rests in such a threatening manner in many railroad cuts. On the Pan Handle Road, between this city and Mansfield, Pennsylvania, fifteen land slides were reported, covering the track with rocks, trees, and earth.

Buffalo, New York: the most severe northeasterly storm of many years passed over this city on the 6th. It commenced at 3.20 a. m. and was accompanied by heavy snow. During the gale a house in process of construction was blown down. The ice in the lake was driven far from the shore.

Rochester, New York: on the morning of the 6th a very severe gale occurred. At Charlotte, near Rochester, the lower docks were flooded; the tracks of the New York Central and Hudson River Railroads were undermined and covered with water to a depth of ten inches. Several buildings were blown down and some damage done to shipping.

Eastport, Maine: during the night of the 6th and morning of the 7th a storm of great severity prevailed at this place. The wind reached a maximum velocity of seventy miles per hour from the northeast. This storm is considered by mariners to have been the severest known in this region since the "Saxby" gale of 1869. Several vessels were damaged and driven ashore. The steamer "United States," lying in the market dock, broke from her anchorage, was driven ashore and damaged. Reports show that this gale, accompanied in places by sleet, was very general along the coasts of New England and the middle Atlantic states. The tides were unusually high; at a number of places large quantities of wreckage drifted ashore.

The heaviest snows of the month occurred during this storm, reports of which will be found under the heading "Snow."

III.—This area of low pressure passed eastward from the north Pacific coast, but the centre could not be definitely located until the morning report of the 8th, when it was enclosed by an isobar of 29.7 in the central Rocky Mountain region, but the preceding report indicated the advance of a low area over the north and central plateau regions. The direction of movement was to the southeast until the centre passed over Arkansas on the 10th, and this movement was in conjunction with a similar movement of the extended high area which continued to the northeast of this storm. The course changed to the northeast on the 10th, and the storm lost energy and disappeared within the limits of the stations of observation by a gradual increase of pressure. During the advance of this depression, general rains fell in the states of the central valleys and in the Lake region, the greatest rainfall occurring in the Ohio Valley.

IV.—This storm may be traced to the central California coast where it appeared on the 10th. It moved eastward over California and Nevada on the 11th, causing general rains on the Pacific coast as far south as San Diego, California, and Yuma, Arizona. The rain continued on the southern California coast until the 13th, and in central California until the 17th. This storm moved directly eastward to western Colorado; thence it moved slowly northeastward over Dakota, causing general rains and severe local storms in the regions west of the upper Mississippi valley. On the afternoon of the 14th

this area of low pressure was central near, and to the west of, Bismarck, Dakota, at the time of the occurrence of the destructive tornadoes in Minnesota. Strong south to east winds were reported in eastern Minnesota at 3 p. m. of that date, while in western Minnesota the winds were from the south and blowing at the rate of from thirty to thirty-five miles per hour. This storm passed directly north from Dakota and disappeared on the 15th, the centre being located far to the north of Manitoba at midnight of that date.

V.—This area of low pressure is marked as central in Colorado on the morning of the 22d, but the tri-daily reports of the 19th, 20th, and 21st indicated that it originated to the south of Arizona the depression moving first to the north over the central plateau regions. It passed directly northeast from Colorado and was central in eastern Dakota at the 10 p. m. report of that date. After reaching the latitude of N. 45° the course changed to the east and it passed over the upper lake region with decreasing energy, the pressure increasing within the enclosed area until it was apparently replaced by the advance of a high area from the north. When this storm was passing over the Lake region a more marked depression appeared to the northward and passed over the lower Saint Lawrence valley. The area of high pressure which followed this last named storm caused the area traced as number iii to disappear before reaching the Atlantic coast. Although this storm cannot be traced to the eastward by isobars drawn for each tenth of an inch of pressure, the severe local storms which occurred in the middle Atlantic states on the 24th indicated that it passed off the middle Atlantic coast, moving slightly to the south of east.

VI.—The tri-daily reports of the 23d indicated the advance of a low area from the Rio Grande Valley but this storm was not clearly defined as an area of low pressure until the afternoon of the 24th, when it was central in northeastern New Mexico. It moved northeastward of Kansas, Nebraska, and Minnesota during the 25th and 26th, attended by heavy rains and severe local storms in the northwestern states, the disturbance reaching its maximum force when central in northwestern Wisconsin on the 26th. From northern Wisconsin it moved directly north, passing over Lake Superior, and after apparently circling to the westward it disappeared north of Manitoba on the 27th.

VII.—This low area formed over the middle slope on the 27th and moved slowly eastward over Kansas and Iowa during the 28th and 29th, the depression being trough-shaped and extending southward to the Gulf coast. The northern portion of this low area apparently disappeared after passing to the east of the upper Mississippi valley, although a slight disturbance may be traced to the south Atlantic coast during the 30th, as indicated by the storm track traced on chart i. Severe local storms occurred in the Gulf States on the 28th, apparently due to a secondary depression which formed in the southwest and south. These storms were especially severe in the southern portion of the east Gulf States on the 28th and 29th.

NORTH ATLANTIC STORMS DURING APRIL, 1886.

[Pressure in inches and millimetres; wind-force by Beaufort scale.]

The paths of the depressions that have appeared over the north Atlantic Ocean during the month are determined, approximately, from international simultaneous observations furnished by captains of ocean steamships and sailing vessels; abstracts of ships' logs and other data collected by the Signal Service agencies at the ports of New York, Boston, and Philadelphia; reports received through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs furnished by the proprietors of the "New York Maritime Register," and from other miscellaneous data, received at this office up to May 21, 1886.

Of the thirteen depressions traced during the month only one, number 3, is a continuation of an area of low pressure traced on the North American continent; number 4 is traced

on the coast of Ireland; number 7 originated northeast of the Bahamas; number 10 appeared in the Gulf of Saint Lawrence; and number 13 developed near Charleston, South Carolina; the remaining depressions developed over the ocean east of W. 50°, from N. 37° to 50°.

The following presents the characteristics of the depressions traced for the present month, as compared with those traced over the north Atlantic in April, 1885: In April, 1885, the general course of the storms was northeasterly, and the tracks were located within a narrow belt of a few degrees width; during April, 1886, the directions of movement exhibit the greatest diversity, and their positions extend from N. 37° to 55°, in longitude from W. 50° to the European coast. A third noticeable characteristic of the storms of the present month is their exceedingly slow rate of progression.

In three depressions, viz., numbers 1, 4, and 11, pressures below 29.00 (736.5) were reported; in the remaining only moderate or slight energy was displayed. East of W. 40° high westerly winds prevailed from the 2d to the 11th; from the 12th to the 15th the winds were generally light and variable; from the 16th to the 28th prevailing from the east, and the 29th and 30th from the south. The month opened with an area of high pressure, 30.50 (774.6), central in N. 35°, W. 45°, and extending westward to the coast of the United States, where the pressure fell below 29.90 (759.4), in N. 40°, due to a low area central over the Lake region. This extended high area remained central in mid-ocean, between N. 30° and 40°, until the 11th, when it moved northeastward and was central off the coast of the British Isles on the 15th, with pressure 30.50 (774.6); from this date to the 18th, inclusive, it extended westward to the thirtieth meridian. On the 10th an area of high pressure passed off the coast of the United States, and on the 11th the pressure was above 30.00 (762.2) over the whole Atlantic between N. 30° and 48°; on the 12th the high area was central near N. 40°, W. 60°, where pressures ranging from 30.70 (779.7) to 30.80 (782.2) were reported, and on the 13th extended eastward to the meridian of W. 50°; on the 14th to W. 45°; on the 15th to W. 40°; and on the 16th joined the high area above described off the British Isles, giving continuously high pressures from America to Europe. On the 17th and 18th the development of depressions numbers 6 and 7 broke this extensive area of high pressure, which then rapidly disappeared. By the 20th low pressure had overspread the whole ocean, except off the coast of the United States, being lowest in the mid-Atlantic, where 29.50 (749.2) was reported. This generally extended low area continued, with falling barometer, from this date to the close of the month, when the pressure at the centre of depression number 11 was reported below 29.00 (736.5).

The following are brief descriptions of the depressions charted:

1.—This storm was the most severe of any occurring during the month, the pressure at the centre ranging from 28.10 (713.7) to 28.75 (730.2). With no indication of its formation on the morning of March 31st, it appeared suddenly near N. 47°, W. 32°, during the afternoon of that date and blew with terrific violence. The hurricane moved northeastward, and at 12 noon (Greenwich time) of the 2d is charted off the northwest coast of the British Isles.

The following special reports describe its formation and severity:

Capt. J. W. Jones, of the s. s. "Chicago," in N. 46° 40', W. 32°, reports: "At noon March 31st, every appearance of a severe storm, the whole sky being of leaden hue, wind increasing to a hurricane, and barometer falling rapidly, reaching 29.28 (743.7) at 5 p. m.; the wind blew in severe gusts from wsw.; at 6 p. m. wind suddenly shifted to nw., blowing tremendously, and terrific sea running; moderated towards midnight, barometer rising." The s. s. "Lord Clive," P. Urquhart, commanding, at 11.30 p. m. (Greenwich mean time) reports wind suddenly increased from an ordinary gale of force about 10 to a terrific hurricane from the nnw., with barometer at 28.20 (716.3), which commenced to rise at once. The hurricane lasted

about one and a half hours, and subsided into a gale. Position, noon (Greenwich mean time) 31st, N. 48° 40', W. 29° 22'. The s. s. "Hermann," H. Baur, commanding, in N. 48° W. 22° 40' to 26°, from noon (Greenwich mean time), March 31st, to April 1st, reports: "31st, 9.40 p. m. (Greenwich mean time), sky dark and gloomy; wind sets in from west with force 7, backs to sse., increasing to force 10, and blowing with this force until 17 h. and 20 m., when it veered to wsw. and wnw., and abated to force 5; at 18 h. it suddenly blew a hurricane from the nne. until 20 h. 10 m.; water and air were indistinguishable at 20.10, wind moderated to force 11, and at 21.40 to 10, blowing with this force from the north and raising a terribly high sea, with heavy breakers, until 6 h. April 1st, then wind and weather moderated gradually."

The following bi-hourly barometer readings, corrected for temperature, are given:

Date.*	Time.	Pressure.	Remarks.
	H. M.	Inches.	
March 31.....	5 30	29.91	This barometer has a correction of + 0.02 inch. Location at time of lowest barometer, N. 47° 42', W. 35° 42'.
Do.....	7 30	29.81	
Do.....	9 30	29.64	
Do.....	11 30	29.25	
Do.....	13 30	28.91	
Do.....	15 30	28.71	
Do.....	17 30	28.51	
Do.....	19 30	28.70	
Do.....	21 30	29.11	
Do.....	23 30	29.32	
April 1.....	1 30	29.44	
Do.....	3 30	29.51	

* Greenwich dates and hours; date begins at noon.

Capt. M. Fitt, of the s. s. "Virginian," reports: "March 31st, 8 p. m., wind south with dark overcast weather and rain, with a very confused sea; glass falling rapidly; 10 p. m., wind shifted to the west with heavy gusts of wind and rain; at midnight the barometer had fallen to 28.55 (725.2), and a fierce nne. wind blew with hurricane force, continuing for six hours; as soon as the wind veered from s. to nne. the pressure began to rise rapidly; position at 12 noon, Greenwich time, April 1st, N. 48° 08', W. 30° 22'." R. Inkster, mate of the s. s. "Queen," reports: "March 31st, at 12 hours (midnight, Greenwich mean time), barometer 28.70 (729.0), wind variable and moderate, shifting from sw. to nw. with heavy rain; wind increased rapidly to a hurricane, reaching its greatest force at 16 hours (Greenwich mean time); position at noon (Greenwich mean time), April 1st, N. 47° 18', W. 26° 28'."

The following is furnished by Mr. J. H. Newman, of the s. s. "Denmark," R. S. Rigby, commanding:

The centre of a violent hurricane, proceeding about ne. by e., or ene., passed this vessel on April 1st, in N. 49° 10', W. 20° 48'. The weather had been rough and unsettled for several days previous, the wind shifting between sw. and nw., blowing strong, with heavy confused seas, and barometer ranging from 29.50 (749.3) to 29.90 (759.4), and temperature from 40° to 50° Fahr. During the whole night of March 30th flashes of distant lightning were observed in the sw. and western horizons, and the sky appeared very threatening. The wind being then wnw., blew a fresh gale, accompanied by fierce squalls and hail, with a high sea and rising barometer. At 1.30 (Greenwich mean time), March 31st, the barometer, standing then at 29.86 (758.4), began to fall and the wind moderated rapidly; at 7.45 light variable airs, falling barometer, and rising temperature; from 10.15 to 13.15 the barometer fell at the rate of one-tenth of an inch an hour, while the wind gradually backed from w. to s., and increased rapidly.

Passage of the southeast quadrant of the hurricane.—At 13.20 (Greenwich mean time) the gale blew strong about s. by w., the sky was obscured by dense, smoky looking clouds and a very heavy sea was running; at 14.50 the course was altered from w. $\frac{1}{2}$ s. to wnw., which course was kept until 18.22; during this time the barometer fell at the rate of 0.16 inch per hour, showing a quicker approach to the vortex; the wind also increased, accompanied by heavy rain and a dangerous southerly sea; at 18.22 the course was again altered to ssw., after which the barometer fell slower (about .10 inch per hour) until 1.12 April 1st, when it reached its lowest reading, 28.08 (713.2). The wind had decreased rapidly during the previous two hours; the clouds broke, but still appeared threatening, and a swell began to rise from the nw.; at 1.30 it was nearly calm, and the centre or vortex may have passed about this time.

Passage of the southwest quadrant of the hurricane.—At 1.43 the wind veered to w.; at 2.08 from w. to nw. by w., and suddenly began to blow with hurricane force; the sea confused and very dangerous, causing the vessel to

labor very heavily and ship large quantities of water; at 3.28 the barometer rose rapidly at the rate of .29 inch per hour; 5.28, the gale broke into terrific squalls, accompanied by hail, after which the barometer rose slowly and the squalls became less frequent and severe; 14.30, phosphorescent lights were seen on each masthead and foreyard-arms, where they remained for some time. The weather continued rough, with a heavy confused sea, for several days, with a mean pressure of 29.52 (749.8).

The following table exhibits the variations in the pressure during the passage of the hurricane, together with the wind-direction and temperature:

Date.*	Greenwich mean time.	Barometer.	Wind.	Temperature.
		Inches.		°
March 31.....	1.14	29.86	wnw.	40
Do.....	10.15	29.68	w.	46
Do.....	13.15	29.36	s. by w.	48
Do.....	17.20	28.73	s. by w.	50
Do.....	22.27	28.40	s. by w.	30
April 1.....	1.27	28.06	calm	49
Do.....	5.28	28.77	nw. by w.	48
Do.....	10.28	29.22	nww.	37
Do.....	14.28	29.30	nww.	39
Do.....	18.29	29.44	nww.	43
Do.....	22.29	29.52	nww.	44

* Date begins at noon, Greenwich time.

The s. s. "Rhyndland," J. C. Jamison, commanding, had gale setting in from the ssw., and shifting between se. and sw.; moderated for half an hour, then had a whole gale of hurricane violence from the nw. The barometer was lowest in N. 48° 40', W. 20° 52'.

The following pressures were observed:

Date.*	Hours.	Pressure.	
		Uncorrected.	Corrected.
		Inches.	Inches.
March 31.....	23	28.89	28.76
Do.....	24	28.79	28.66
April 1.....	1	28.59	28.46

* Greenwich dates and hours; date begins at noon.

The s. s. "India," M. Kilsen, commanding, encountered a hurricane lasting from 10 p. m., March 31st, to 9 a. m., April 1st, blowing these eleven hours with a force of 12. In N. 47° 50', W. 24° 45', the barometer fell to 28.26 (717.8), corrected reading, at 2 a. m., April 1st. The s. s. "Palestine," W. Whiteway, commanding, reports: April 1st, in N. 51° 06', W. 23° 30', fresh se. breeze and heavy rain, wind shifted to ne. and began strong gale at 6 a. m., with hail and snow and very high seas, then backed to n. at 8 a. m. and blew with hurricane force, accompanied by hail, snow, and violent squalls; hove ship to, with head to wind; 8 p. m. gale began to moderate; barometer 29.04 (737.6) at noon, after which it began to rise.

The s. s. "Milanese," John Trinick, commanding, in N. 45° 44', W. 25° 51', April 1st, reports gale continued from midnight of March 31st, blowing with storm force, veered to wnw. at 1 a. m.; barometer at noon April 1st, 29.76 (755.9). The s. s. "Seythia," T. Roberts, commanding, in N. 51° 13', W. 13° 9', had lowest barometer, 29.27 (743.4), at 8 p. m. April 1st; gale set in from wsw. on the 31st, accompanied by lightning in the west; increased to whole gale on the 1st, continuing with same force on the 2d, with fierce hail squalls and heavy seas. The s. s. "City of Berlin," Francis Land, commanding, reports: "9 a. m. (Greenwich mean time) April 1st, in N. 51°, W. 17°, had a severe gale from the south with a very high sea; lowest barometer at 9 p. m. (Greenwich mean time) on the 2d, 28.74 (730.0); wind veered from sw. to wnw. and blew with force 11 and 12, accompanied by violent squalls." Capt. A. E. Jadel, of the s. s. "Canada," reports: "From 1 a. m. to 4 a. m. on the 1st very stormy from south, followed by calm for an hour, after which a north-wind hurricane, force 12, set in with the heaviest sea I ever experienced. In N. 48° 53', W. 25° 25', the barometer fell to 28.35 (720.2) at 4 a. m."

The following table gives additional observations, from other

vessels, of the lowest pressure observed during the passage of this storm, with the position and time of observation:

Steamship.	Position.	Date.	Hour.	Pressure.
	N. W. S. E.			Inches.
Moravia.....	N. 47 50, W. 29 26	Mar. 31	12 midnight.	28.80
Grecian Monarch.....	N. 48 48, W. 27 00	Apr. 1	2 a. m.	28.74
Lepanto.....	N. 44 49, W. 26 2	Apr. 1	4 a. m.	29.35
Waldensian.....	N. 39 43, W. 26 2	Apr. 1	4 a. m.	29.35
Richmond Hill.....	N. 39 4, W. 15 6	Apr. 1	4-30 p. m.	28.29

2.—This storm appeared on the 6th near N. 50°, W. 39°, and was apparently drawn eastward and absorbed by the extensive storm-area which appeared off the coast of Ireland on the 8th. The s. s. "Devonia," in N. 52°, W. 28° 30', had pressure 29.30 (744.1), at 6 p. m. of the 6th, with wind blowing a whole gale from the s. to e. At 7 a. m. of the 6th vessels to the south of the storm-centre had pressure ranging from 29.79 (756.6) to 29.97 (761.1), with moderate westerly winds, while to the eastward the wind was southerly, with rain.

3.—This depression is a continuation of low area number ii described in this REVIEW. It reached the New Jersey coast on the 7th, and was appreciable off the middle Atlantic coast on the 6th, where fresh to strong southerly gales and rain were reported. During the 7th the depression moved eastward off the New Jersey coast and at 7 a. m. of the 8th was central N. 41°, W. 65°, with a barometric pressure of 29.70 (754.3), rain and moderate winds centering to this point. During the next twenty-four hours it moved north of east to N. 44°, W. 54°, with a slight increase in pressure. Vessels to the southward and eastward reported southerly winds and fair weather. By the morning of the 10th it had moved to N. 45°, W. 49°, with rain and fresh westerly winds to the southward, and moderate southwest gales to the southeast. At 7 a. m. of the 11th the depression had moved northeastward to N. 53°, W. 33°. The pressure had fallen slightly to about 29.70 (754.3), and moderate southwest gales and fair weather were reported to the southeastward. The storm thereafter pursued a northeastwardly course beyond the region of observation.

4.—This storm appeared on the southern coast of Ireland on the morning of the 8th, having apparently advanced from the northwest, and dominated the wind-direction as far as W. 35°. The pressure ranged to 29.16 (740.6) and increased rapidly to the westward. Strong west to northwest gales were reported to W. 31°, continuing during the 9th and 10th, and accompanied by heavy rain, hail, and snow squalls off the south and southeast coasts of Ireland. The s. s. "Catalonia," Capt. Alex. McKay, commanding, encountered a strong westerly gale, April 8th, in N. 51° 20', W. 10° 00', barometer, 29.25 (742.9) at 4 a. m. "The storm continued during the 8th and 9th accompanied by hard hail squalls; blowing heaviest on the 9th from the northwest, with rising barometer." Capt. E. Parry, of s. s. "Bulgarian," reported as follows: "April 9th, in N. 51° 48', W. 7° 01', strong breeze, northwest, with snow squalls; fresh breeze, northwest, with heavy hail squalls at midnight. April 10th, in N. 51° 11', W. 12° 31', moderate gale, nw. in a. m., veering to north and increasing to fresh gale, with heavy squalls and high seas, moderating at midnight." The area of lowest pressure moved eastward beyond the region of observation during the 8th, but strong westerly gales continued during the 9th, 10th, and 11th, to N. 44°.

5.—This storm appeared on the 12th in N. 42°, W. 40°, with a pressure of about 29.88 (759.0). During that date fresh to strong northerly gales and rain were reported by vessels to the northward and northwestward. On the morning of the 13th the storm-centre had moved due east one degree and the pressure had diminished to about 29.67 (753.5). Fresh to brisk gales, centering to the low area, accompanied by rain, were reported by vessels between N. 40° and 49°, and W. 30° and 40°. From this point the depression assumed a northeasterly course, being central at 7 a. m. of the 14th near N. 45°, W. 37°. Fresh to strong gales, with clearing weather, were reported by

vessels in the vicinity. During this date the depression moved northward out of the region of observation.

6.—The presence of this depression is indicated by charted reports of the 17th; the area of low was apparently central about N. 39°, W. 40°. The s. s. "Hugo," in N. 37° 5', W. 46°, on that date, reported strong northwest gales, with rain and hail, continuing during the day, with a barometric pressure at 7.30 a. m. of 29.88 (759.0). From the 17th to the 22d the depression remained nearly stationary, with falling barometer and increasing energy.

The bark "Exile," in N. 39° 04', W. 40° 55', referring to this storm, reported, as follows: "21st, 6 p. m., strong wind, with heavy squalls of rain and very heavy gusts, amounting to force 10 in the gusts; barometer 29.45 (747.9); wind backing from west to southwest. 22d, 2 a. m., strong gale, with squalls of rain and heavy gusts of wind, backing to east; barometer 29.35 (745.0); 6 a. m., N. 39° 26', W. 43° 24', more moderate; no squalls; barometer 29.45 (747.9); a very heavy sea from west to north; barometer rising."

Reports from vessels to the west and northwest show strong north to west gales, rain, and heavy squalls between N. 39° and 45°, and W. 38° and 50°, from the 21st to the 24th. On the 22d the s. s. "Sacrobosco," R. S. Thompson, commanding, encountered in N. 41° 30', W. 48° 30', a west gale of 7 to 8, at 3 p. m. (Greenwich mean time); barometer 29.07 (738.3). At 9 a. m. (Greenwich mean time) of the 23d there had been no change in wind-direction or force, the barometer standing at 29.07 (738.3) firm. At 7 a. m. of the 23d this low area had moved to N. 39°, W. 29°, with rising barometer and decreasing force. On the morning of the 24th it is charted N. 40°, W. 23°, with fresh westerly gales to the southward. From thence it moved slightly south of east to N. 39°, W. 15°, from that point passing southeast beyond the limit of reports during the 25th and 26th.

7.—This depression first appeared on the morning of the 18th in N. 25°, W. 72°, with a barometric pressure of about 29.71 (754.5). During the 19th and 20th it moved northeastward, with slightly decreasing pressure, to N. 29°, W. 70°, from thence moving eastward to N. 29°, W. 65°, on the 21st, beyond the limits of reports. Capt. F. Stevens, commanding s. s. "Manhattan," makes the following report relative to this storm: "In N. 29° 56', W. 79° 36', on the 19th, encountered a whole gale from the ene., continuing, at intervals, until the 21st, with very heavy irregular seas; lowest barometer 30.07 (763.7), at 6.42 a. m. of the 19th."

8.—At 7 a. m. of the 21st a depression with barometer about 29.48 (748.7) appeared near N. 40°, W. 18°, moving slightly to the northeast during the ensuing twenty-four hours, accompanied to the southward by winds attaining the force of moderate gales. On the morning of the 23d the storm had moved northward to N. 47°, W. 15°, with decreasing pressure. It then pursued a northwesterly course to N. 50°, W. 19° on the 24th, and N. 55°, W. 25° on the 25th, accompanied during the 25th by rain to the east and southeastward.

9.—This storm appeared on the chart of the 22d in N. 47°, W. 44°, with a pressure of 29.61 (752.0). It took a southeasterly course to N. 45°, W. 41° by 7 a. m. of the 23d and to N. 44°, W. 40° by the morning of the 24th, with pressure decreasing to 29.31 (744.4) and fresh to strong west to north gales to the westward. On the morning of the 25th it appeared at N. 44°, W. 36°. Pursuing a northerly course the depression was central on the morning of the 26th at N. 46°, W. 35°, with slight barometric changes and brisk easterly gales and rain to the northeastward. At 7 a. m. of the 27th it had moved north of east to N. 47°, W. 30°, with rising barometer and fresh gales centering to that point. During the 27th it passed north-eastward out of the line of reports. The reports at hand cite no unusual features in connection with this storm.

10.—This depression appeared in the Gulf of Saint Lawrence on the morning of the 24th, with a pressure of 29.47 (748.5) at Sydney. Passing rapidly southeastward the storm was central at 7 a. m. of the 25th at N. 44°, W. 50°, with a pressure of

29.55 (750.5), after which date it disappeared, without developing noteworthy features.

11.—This storm, following a northwesterly course, first appears on the 27th, in N. 41°, W. 49°, with a barometric pressure of 29.28 (743.6), accompanied by fresh and brisk gales and rain. On the morning of the 28th it had moved to N. 44°, W. 51°, with increasing pressure and diminishing wind force. From this point it moved slightly east of north to N. 45°, W. 50° on the morning of the 29th; passing out of the region of reports on that date. Beyond the prevalence of fresh and brisk gales and rain attending its course, no unusual features are reported as having been noted in connection with this storm.

12.—A slight barometric depression appeared on the 27th in N. 50°, W. 17°, from which point it moved south of east to N. 48°, W. 7° by the morning of the 28th, with a slight decrease in pressure, passing eastward of the region covered by maritime reports on this date. The storm was not of a violent nature.

13.—This depression appeared off the south Atlantic coast on the morning of the 29th, with a pressure of 29.50 (749.4), taking a northeasterly course to N. 37°, W. 70° by 7 a. m. of the 30th, with moderate northeast gales to the northward.

OCEAN ICE.

On chart i are also exhibited the eastern and southern limits of the region within which icebergs and field ice have been observed during April, 1886. These limits have been determined from reports furnished by shipmasters, and from trustworthy data published in the "New York Maritime Register" and other newspapers. During this month the easternmost iceberg was observed in N. 47° 43', W. 30° 11', by the ship "Ruby," E. E. Robbins, commanding; from that point westward to about W. 45°, but two isolated bergs were observed.

From N. 42° to N. 43°, between W. 49° and W. 50°, icebergs were very numerous, together with much thick field ice; the bergs, as a rule, were small. The southernmost iceberg was reported in N. 40° 51', W. 46° 59'.

A comparison with the chart for the preceding month (March, 1886) shows a very extensive and unusually rapid movement of ice to the eastward and southward; the eastern limit for April being about fourteen degrees further east than that of the preceding month. The southern limit is about four degrees south of the southern limit for March. As compared with April, 1885, the eastern limit is about nine degrees further east, and is the easternmost limit ever reported to this office for April.

The following table shows the comparison between April, 1886, and the same month of the three preceding years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Lon. W.	Month.	Lat. N.	Lon. W.
	° /	° /		° /	° /
April, 1883.....	40 49	52 06	April, 1883.....	48 00	43 00
April, 1884.....	41 26	48 46	April, 1884.....	45 25	43 34
April, 1885.....	41 40	49 50	April, 1885.....	44 10	39 41
April, 1886.....	40 51	46 59	April, 1886.....	47 43	30 11

Icebergs and field ice were reported during April, 1886, as follows:

April 11th.—S. S. "State of Nebraska," in N. 45° 00', W. 47° 53', passed an iceberg and a small floe at 6.50 p. m.

12th.—S. S. "British Crown," in N. 44° 58', W. 47° 57', passed an iceberg at 2.30 p. m.

13th.—S. S. "Indiana," in N. 40° 51', W. 46° 59', passed a large iceberg.

16th.—S. S. "Jan Breydel," passed two icebergs, each about sixty feet high, in N. 44° 24', W. 48° 28'.

18th.—S. S. "Warwick," in N. 44° 00', W. 48° 00', at 9 p. m., passed a large quantity of thick field ice, extending for a number of miles. The s. s. "Elizabeth Allen," in N. 47° 00', W. 47° 20', passed through large quantities of ice.

19th.—S. S. "Zaandam," in N. 42° 47', W. 49° 24', passed four small icebergs at 10 p. m. The s. s. "Critic," in N. 43° 56', W.

48° 38', from noon to 3 p. m., passed through a number of icebergs and a quantity of thick field ice, extending a great distance in all directions. The s. s. "Hermann," in N. 42° 45', W. 49° 48', passed three detached pieces of floating ice, one piece being quite large, but not a berg. The s. s. "City of Chicago," in N. 42° 52', W. 49° 20', passed through ten miles of field ice. The s. s. "Azalea," in N. 42° 50', W. 49° 50', passed through a great quantity of field ice. The s. s. "Etna," in N. 42° 54', W. 49° 00', passed through a small quantity of field ice. The s. s. "Hammonia," in N. 43° 36', W. 49° 20', passed several small ice-fields. The s. s. "Ruby," in N. 47° 43', W. 30° 11', passed a large iceberg. The s. s. "Faedrelaudet," in N. 47° 11', W. 47° 29', at 2 p. m., passed large quantities of field ice.

20th.—S. S. "Faedrelaudet," in N. 44° 49', W. 48° 57', at 8 a. m., passed a large iceberg. The s. s. "Stockholm City," in N. 44° 50', W. 47° 10', at 5 a. m., passed two medium-sized icebergs, bearing se. and nw., and at 3.30 p. m. passed large quantities of drift ice, and at 6 p. m., in N. 44° 12', W. 50° 36' passed a large iceberg, bearing w. by n., and apparently grounded; at 8 p. m. less drift ice in vicinity of ship, temperature of air being 32° and water 37°. The s. s. "Gertrude," in N. 43° 36', W. 45°, passed large quantities of drift ice, and one very large iceberg.

22d.—S. S. "Peruvian," in N. 42° 55', W. 53° 39', from 8.30 to 11.30 a. m., passed patches of small field ice and several icebergs. The s. s. "Toronto," in N. 44° 20', W. 47° 30', toward evening passed a small patch of field ice. The ship "John T. Berry," in N. 44°, W. 52°, passed eighteen icebergs of various sizes and two fields of ice, one of which was about six miles long, could not see across it from aloft; the other about four miles long. The s. s. "Prussian," in N. 42° 40', W. 49° 30', at 9 a. m., passed two small icebergs, and at 9.40 a. m., in N. 42° 40', W. 50° 20', passed large quantities of detached and field ice, extending about thirty miles, and at 11.20 a. m., passed one large iceberg; clear of all ice at noon. The s. s. "Circassia," in N. 43° 36' to 42°, W. 48° 50' to 50°, from 10.15 a. m. to 4 p. m., passed a number of icebergs, one very large, and a large quantity of field ice. The s. s. "Polaria," in N. 42° 30', W. 50° 40', passed a medium-sized iceberg. The s. s. "A. McDougall," in N. 42° 40', W. 49° 34', passed two small icebergs; in N. 42° 41', W. 50° 09', passed a large iceberg; between these two positions was a large quantity of detached and field ice, extending westward about twenty-seven miles.

23d.—S. S. "Jersey City," in N. 45°, W. 46°, passed three large icebergs. The bark "Mithassel," in N. 43°, W. 49°, passed through a quantity of enormous icebergs. The ship "Ruby," in N. 43°, W. 48° to 50°, passed nine large bergs and a considerable quantity of drift ice.

24th.—S. S. "State of Indiana," in N. 42° 40', W. 49° 50', to N. 42° 18', W. 51° 58', from 7 a. m. to 3.30 p. m., passed twelve icebergs, some of them very large, and a quantity of thick field ice. The s. s. "Nevada," in N. 42° 55', W. 50° 20', passed two large icebergs. The s. s. "Columbia," from 8 a. m. to 2 p. m., in N. 42° 20', W. 49° 30', and N. 42° 20', W. 49° 57', and N. 42° 20', W. 50° 11', and N. 42° 14', W. 51° 01', passed several icebergs and some thick field ice. The s. s. "Crystal," in N. 45° 20', W. 48° 30', at 6 a. m., passed through a quantity of broken ice, apparently a collapsed iceberg. The s. s. "Main," in N. 43° 28', W. 49° 19', passed three small icebergs. The s. s. "Wyoming," in N. 43°, W. 50°, passed a number of immense icebergs.

25th.—S. S. "Helvetia," in N. 42° 27', W. 49° 43', passed a large iceberg and several large pieces of ice. The s. s. "Thingvall," in N. 44° 5', W. 49° 51', passed two small icebergs; s. s. "Germanic," at 2 p. m., in N. 42° 33', W. 50° 34', passed a large iceberg, and at 3 p. m., in N. 42° 37', W. 50° 15', passed a large iceberg, and at 4 p. m., in N. 42° 31', W. 49° 49', passed a large iceberg; ship "Prince Victor," in N. 47°, W. —, passed through much field ice; steered one hundred and fifty miles to the southward to clear it.

26th.—Ship "New City," in N. 43°, W. 48°, passed one very large and three medium-sized icebergs.

27th.—S. S. "Furnesia," in N. 42° 37' to 42° 39', W. 52° 27', passed two icebergs; s. s. "California," at 7.30 a. m., in N. 42° 16', W. 51° 36', passed two icebergs; s. s. "Durham City," passed two very large icebergs, each about one hundred feet high; one at 9.45 a. m., N. 43° 26', W. 49° 30'; the other at 5.30 p. m., in N. 43° 5', W. 51° 55'; s. s. "Westphalia," in N. 42° 50', W. 50° 40', at 8 a. m., passed a small iceberg; temperature of water, 28°; air, 33°; another, thirty-six feet high, in N. 42° 40', W. 51° 20', at 10.35 a. m.; temperature of water, 30°; air, 39°, and in N. 42° 35', W. 52° 04', two from forty to eighty feet high; temperature of water, 42°; air, 42°; s. s. "City of Montreal," passed icebergs, from 1 to 7 p. m., between N. 42° 41', W. 49° 50', and N. 42° 35', W. 52° 14'.

28th.—S. S. "City of Montreal," passed icebergs at 12 m., in N. 42° 18', W. 55° 30'; s. s. "Rhaetia," in N. 47° 26', W. 40° 43'; passed a small piece of ice twelve feet in length; s. s. "Australia," in N. 42° 22', W. 50° 14' passed a small iceberg; temperature of water, 36°; air, 39°; passed another iceberg, seventy feet high and three hundred feet long, in N. 42° 19', W. 51° 42'.

29th.—S. S. "Umbria," between N. 42° 53', W. 50° 19', and N. 42° 14', W. 52° 12', from 12.40 p. m. to 5.10 p. m., passed several icebergs; s. s. "Australia," in N. 42° 19', W. 57° 42', passed an iceberg about seventy feet high.

30th.—S. S. "Venetian," in N. 43° 27', W. 49° 25' at 9.10 a. m., passed an iceberg six hundred feet long, one hundred and fifty feet wide and one hundred and twenty feet high; s. s. "Braendaille," between N. 45° 43', W. 51° 45' and N. 45° 33', W. 55° 10', from 2.35 p. m. to 3.30 a. m., passed a large iceberg, then passed through small scattering ones and finally passed a very large one; ship "Thos. Hilyard," in N. 42° 20', W. 50° 30', passed an iceberg; s. s. "Norwegian," passed an iceberg at 10 a. m., in N. 42° 19', W. 49° 53', and at 3.30 p. m., in N. 42° 15', W. 51° 04', passed an iceberg and two small pieces of ice.

SIGNAL SERVICE AGENCIES.

Signal Service agencies have been established in the Maritime Exchange buildings at New York City and Philadelphia, and in the Custom-House, Boston, where the necessary blanks and other information will be furnished to ship-masters.

In pursuance of the arrangements made with the Meteorological Office of London, England, there were cabled to that office from New York during April, 1886, four reports concerning storms encountered by vessels in the Atlantic west of the forty-fifth meridian; one message was sent from Boston.

TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

The distribution of mean temperature over the United States and Canada for April, 1886, is exhibited on chart ii by the dotted isothermal lines; and in the tables of miscellaneous data are given the monthly mean temperatures, with the departures from the normal, for the various stations of the Signal Service.

On chart iv the departures from the normal temperature are illustrated by lines connecting stations of normal or equal abnormal values.

Over the northern districts, east of the Rocky Mountains, the mean temperatures for April, 1886, are above the normal; on the Pacific coast, in the middle slope, middle plateau, and over all southern districts they are below the normal. The most marked departures above the normal occurred in northern Minnesota, where, at Saint Vincent and Moorhead, they amount to 9° 4 and 7° 2, respectively. In the upper Mississippi and upper Ohio valleys and over portions of the lower lake region, New England, and the middle Atlantic states the temperatures generally range from 4° to 5° above the normal.

Over the country where the temperatures are below the normal, departures are generally slight; they nowhere exceed 5°, and for the most part are less than 2°. The departures below the normal are greatest in Florida and along the Gulf coast.

The following are some of the most marked departures from the normal temperature at Signal Service stations:

Above normal.		Below normal.	
Saint Vincent, Minnesota	9.4	Sanford, Florida	4.7
Mount Washington, New Hampshire	7.7	Cedar Keys, Florida	4.6
Moorhead, Minnesota	7.2	San Antonio, Texas	4.2
Pittsburg, Pennsylvania	5.5	Winnemucca, Nevada	3.4
La Crosse, Wisconsin	5.4	New Orleans, Louisiana	3.2
Albany, New York	5.2	Brownsville, Texas	3.1
Buffalo, New York	5.1	Mobile, Alabama	3.1
Bismarck, Dakota	4.6	Galveston, Texas	3.0

DEVIATIONS FROM NORMAL TEMPERATURES.

In the table below are given, for certain stations, as reported by voluntary observers, the normal temperatures for April for a series of years, the mean temperature for April, 1886, and the departures from the normal:

Station.	County.	Normal temperature for April.	Number of years.	Mean temperature for April, 1886.	Departure.
<i>Arkansas.</i>					
Lead Hill	Bonne	60.9	4	60.0	- 0.9
<i>California.</i>					
Sacramento	Sacramento	59.3	20	58.4	- 0.9
<i>Connecticut.</i>					
Middletown	Middlesex	45.4	28	49.6	+ 4.2
New Haven	New Haven	46.8	100	48.3	+ 1.5
Thompson	Windham	44.2	30	48.7	+ 4.5
<i>Dakota.</i>					
Webster	Day	43.2	3	49.5	+ 6.3
<i>Illinois.</i>					
Anna	Union	57.7	11	58.2	+ 0.5
Mattoon	Coles	53.0	6	57.0	+ 4.0
Peoria	Peoria	51.9	30	57.7	+ 5.8
Riley	McHenry	44.2	25	47.4	+ 3.2
Sycamore	De Kalb	45.6	4	48.3	+ 2.7
<i>Indiana.</i>					
Lafayette	Tippecanoe	49.9	7	53.9	+ 4.0
Logansport	Cass	53.0	31	57.7	+ 4.7
Spiceland	Henry	49.9	32	53.3	+ 3.4
Vevay	Switzerland	54.8	21	55.9	+ 1.1
<i>Iowa.</i>					
Clinton	Clinton	48.8	8	51.3	+ 2.5
Cresco	Howard	45.9	10	48.1	+ 2.2
Monticello	Jones	48.1	33	50.9	+ 2.8
<i>Kansas.</i>					
Independence	Montgomery	56.9	15	55.3	- 1.6
Wellington	Sumner	55.3	8	54.3	- 1.0
Yates Centre	Woodson	53.6	6	53.7	- 0.1
<i>Maine.</i>					
Belfast	Waldo	41.1	27	45.0	+ 3.9
Bridgeton	Cumberland	41.5	11	45.3	+ 3.8
Cornish	York	40.4	29	46.1	+ 5.7
Gardiner	Kennebec	41.4	50	44.5	+ 3.1
Orono	Penobscot	40.0	18	43.6	+ 3.6
<i>Maryland.</i>					
Fallston	Harford	49.6	15	52.1	+ 2.5
<i>Massachusetts.</i>					
Amherst	Hampshire	45.2	49	51.3	+ 6.1
Cambridge	Middlesex	44.3	64	49.0	+ 4.7
Fitchburg	Worcester	42.5	30	47.7	+ 5.2
Lowell	Middlesex	45.0	10	50.6	+ 5.6
New Bedford	Bristol	44.5	74	46.9	+ 2.4
Somerset	Bristol	45.4	16	50.2	+ 4.8
Taunton	Bristol	46.5	16	49.1	+ 2.6
Springfield	Hampden	46.0	19	51.7	+ 5.7
Williamstown	Berkshire	43.4	33	48.2	+ 4.8
Worcester	Worcester	44.7	47	48.1	+ 3.4
<i>Nevada.</i>					
Carson City	Ormsby	47.7	7	47.5	- 0.2
<i>New Brunswick.</i>					
Saint John	Saint John	37.4	26	39.1	+ 1.7
<i>New Hampshire.</i>					
Concord	Merrimac	46.8	18	50.4	+ 3.6
Hanover	Grafton	47.3	25	46.7	- 0.6
<i>New Jersey.</i>					
South Orange	Essex	48.4	16	51.4	+ 3.0
<i>New York.</i>					
North Volney	Oswego	41.3	19	47.0	+ 5.7
Palermo	Oswego	41.3	33	46.4	+ 5.1
Plattsburg Barracks	Clinton	40.7	17	45.3	+ 4.6
<i>Ohio.</i>					
Wansee	Fulton	46.1	16	50.8	+ 4.7
<i>Pennsylvania.</i>					
Wellsborough	Tioga	43.9	15	52.0	+ 8.1
<i>South Carolina.</i>					
Stateburg	Sumpter	62.1	6	60.6	- 1.5
<i>Texas.</i>					
New Ulm	Austin	68.3	14	66.6	- 1.7
<i>Vermont.</i>					
Lunenburg	Essex	37.9	38	44.1	+ 6.2
Strafford	Orange	41.1	13	48.3	+ 7.2
<i>Virginia.</i>					
Bird's Nest	Northampton	54.8	18	57.9	+ 3.1
Dale Enterprise	Rockingham	51.7	6	59.1	+ 7.4
Variety Mills	Nelson	54.0	9	54.8	+ 0.8
Wytheville	Wythe	52.1	32	54.0	+ 1.9
<i>West Virginia.</i>					
Helvetia	Randolph	48.2	10	51.5	+ 3.3

* From the "Bulletin of the New England Meteorological Society."

In connection with this subject, the following notes are furnished by voluntary observers:

Dakota.—Webster, Day county: the mean maximum temperature was 10° 9, and the mean minimum 4° 5 above the average for March. The season this spring was about three weeks in advance of that of the three preceding years.

Illinois.—Riley, McHenry county: under the influence of the unusually warm weather, vegetation advanced with unexampled rapidity for the season. No snow fell in April, being the first April without snow, with one exception (1878), since 1870.

Indiana.—Vevay, Switzerland county: the maximum temperature that has occurred in any April for twenty-one years was 97° 0, in 1886; minimum for the same time, 12° 0, in 1875.

Spiceland, Henry county: the highest temperature during April for a period of thirty-two years was 93° 0, in 1855; lowest for same period, 11° 0, in 1857.

Iowa.—Monticello, Jones county: the highest April temperature during a period of thirty-three years was 94° 0, in 1855; lowest in that time, 12° 0, in 1874.

Kansas.—Wellington, Sumner county: the maximum temperature of April, 1880, 92° 0, is the highest that has occurred at this place in April during the past eight years; the minimum for the same time and month is 15° 0, in 1881.

Yates Centre, Woodson county: the season this spring is at least fifteen days later than 1885.

Maine.—Gardiner, Kennebec county: during the past fifty years there have been only five Aprils warmer than this, the mean April temperature for 1840 and 1878 being 45° 3 and 45° 9, respectively; the coldest was in 1874, 35° 0.

Cornish, York county: the highest mean temperature for April in twenty-nine years was 46° 4, in 1878; the lowest during the same period was 34° 1, in 1874.

Maryland.—Fallston, Harford county: the warmest April for fifteen years occurred in 1871, the mean temperature for April in that year being 55° 7; the coldest April for the same period was in 1874, mean temperature being 43° 9.

Massachusetts.—Westborough, Worcester county: the average temperature for the present April, 51° 5, is higher than any April for twenty years.

Worcester, Worcester county: the warmest April during the past fifty years was in 1844, the mean being 54° 0; the coldest was in 1855, the mean being 32° 3. The following further comparisons of April, during the past half century, will be of interest: Mean temperature, 1886, 47° 4; 1885, 42° 9; 1855, 32° 3; 1844, 54°. Minimum temperature, 1886, 28°; 1885, 25°; 1855, 20°; 1844, 18°. Maximum temperature, 1886, 76°; 1885, 78°; 1855, 67°; 1844, 86°. Minimum mean temperature, 1886, 31° 2; 1885, 29° 5; 1855, 24° 5; 1844, 29° 2. Maximum mean temperature, 1886, 65° 5; 1885, 64° 5; 1855, 60° 7; 1844, 73° 5.

Fitchburg, Worcester county: the highest temperature during the month was 78° 0; the lowest, 28° 0.

Michigan.—Thornville, Lapeer county: April was an unusually warm month, the mean being four or five degrees above the normal. The last frost occurred on the night of the 11th.

New York.—Palermo, Oswego county: this is the warmest April in the past fifteen years except 1876, when the mean was 50° 0.

North Volney, Oswego county: the coldest April during the preceding nineteen years was in 1874, the mean being 33° 6. The warmest was 1878, mean being 50° 9.

Ohio.—Wauseon, Fulton county: the mean maximum temperature that has occurred in any April for sixteen years was 54° 8, in 1878; the mean minimum for the same time was 38° 6, in 1874.

Texas.—New Ulm, Austin county: the highest April temperature in fourteen years was 95° 0, in 1880; the lowest was 35° 0, in 1875. The mean maximum temperature during the same period was 77° 4, in 1879; mean minimum was 63° 6, in 1875.

Vermont.—Strafford, Orange county: the mean temperature for the present month, 48° 3, is the highest that has been recorded in any April during the past twelve years; the mean temperature of 1875, 35° 7, was the lowest.

Virginia.—Variety Mills, Nelson county: the highest mean temperature for April during the last nine years, 58° 3, occurred in 1878; lowest mean was 51° 3, in 1881.

West Virginia.—Helvetia, Randolph county: with the exception of 1878, when the mean temperature was 53° 4, this April has the highest mean that has occurred during the last ten years.

RANGES OF TEMPERATURE.

The monthly, and the greatest and least daily ranges of temperature, are given in the tables of miscellaneous meteorological data.

The following are some of the greatest and least monthly ranges at Signal Service stations:

Greatest.		Least.	
	o		o
Saint Vincent, Minnesota.....	83.6	Fort Canby, Washington Territory ...	25.9
Fort Totten, Dakota.....	82.2	San Diego, California	25.0
Moorhead, Minnesota.....	80.7	Port Angeles, Washington Territory ..	27.8
West Las Animas, Colorado.....	76.3	Neah Bay, Washington Territory	29.5
Yankton, Dakota.....	76.2	Pyshet, Washington Territory	30.0
Huron, Dakota.....	74.2	Astoria, Oregon.....	31.0
Bismarck, Dakota.....	71.6	Fort Macon, North Carolina.....	32.1
Poplar River, Montana.....	71.0	San Francisco, California.....	34.5

In the following table are given the mean temperatures for the several geographical districts, with the normals and departures, as deduced from Signal Service observations:

Average temperatures for April.

Districts.	Average for April Signal-Service ob- servations.		Comparison of April, 1886, with the average for several years.
	For sev- eral years.	For 1886.	
New England.....	43.5	46.4	+ 2.9
Middle Atlantic States.....	50.3	52.7	+ 2.4
South Atlantic States.....	61.2	61.2	0.0
Florida Peninsula.....	70.0	66.1	- 3.9
Eastern Gulf States.....	64.9	63.3	- 1.6
Western Gulf States.....	66.5	64.3	- 2.2
Rio Grande Valley.....	75.6	73.4	- 2.2
Tennessee.....	59.5	59.6	+ 0.1
Ohio Valley.....	53.4	55.8	+ 2.4
Lower Lake region.....	44.2	47.8	+ 3.6
Upper Lake region.....	39.4	41.6	+ 2.2
Extreme Northwest.....	38.3	43.0	+ 4.7
Upper Mississippi Valley.....	51.1	54.4	+ 3.3
Missouri Valley.....	48.1	49.7	+ 1.6
Northern slope.....	42.3	44.6	+ 2.3
Middle slope.....	49.7	48.9	- 0.8
Southern slope.....	62.2	61.0	- 1.2
Southern plateau.....	57.9	56.1	- 1.8
Middle plateau.....	48.2	45.8	- 2.4
Northern plateau.....			
North Pacific coast region.....	50.3	49.1	- 1.2
Middle Pacific coast region.....	57.2	56.0	- 1.2
South Pacific coast region.....	61.8	60.6	- 1.2

FROSTS.

Frosts occurred in the various states and territories during the month on the following dates:

Alabama.—Montgomery, 1st, 6th; Birmingham, Greensborough, and Prattville, 1st, 6th, 8th.

Arizona.—Willcox, 1st, 5th, 6th, 7th, 12th, 14th, 15th, 16th, 20th; Fort Grant, 3d, 4th, 5th, 8th; Prescott, 3d, 4th, 5th, 14th, 15th, 16th, 21st, 22d, 24th, 26th.

Arkansas.—Little Rock and Fort Smith, 1st; Lead Hill, 1st, 5th to 8th, 27th.

California.—Sacramento, 2d to 5th, 12th, 13th, 14th; Princeton, Oakland, and Sacramento, 3d, 4th; Red Bluff and San Francisco, 3d; Murietta, 3d, 4th, 5th; San Rafael, 3d, 4th, 12th, 13th; Hydesville, 30th.

Colorado.—1st to 11th, 13th to 17th, 20th, 22d, 23d, 25th to 29th.

Connecticut.—1st, 2d, 8th, 9th, 30th.

Dakota.—1st to 30th.

Florida.—Pensacola, 1st, 6th; Archer, 6th to 9th; Sanford, 7th.

Georgia.—Dahlonega, 1st; Athens, 1st, 2d, 7th, 8th; Forsyth, 1st, 2d; Quitman, 1st, 6th; Atlanta, 1st, 6th, 8th; Savannah, 1st, 7th, 8th, 9th; Milledgeville, 1st, 8th, 9th; Augusta, 8th, 9th.

Idaho.—4th, 13th, 18th, 19th, 20th.

Illinois.—1st to 8th.

Indiana.—1st to 10th.

Indian Territory.—2d to 6th.

Iowa.—1st to 8th.

Kansas.—1st to 7th.

Kentucky.—Richmond, 1st to 8th; Frankfort and Louisville, 8th, 9th.

Louisiana.—Liberty Hill, Luling, and Shreveport, 6th, 7th.

Maine.—3d, 7th, 9th, 11th, 12th, 16th, 17th, 25th, 28th, 29th, 30th.

Maryland.—Woodstock, 9th.

Massachusetts.—2d to 6th, 9th, 15th, 27th, 30th.

Michigan.—1st to 30th.

Minnesota.—1st to 10th, 20th, 24th, 28th.

Mississippi.—Vicksburg, 6th.

Missouri.—Lamar, 1st, 5th, 6th, 7th; Carthage, 5th, 6th, 7th.

Montana.—1st to 10th, 18th, 19th, 20th, 22d, 23d, 26th, 28th, 29th.

Table of comparative maximum and minimum temperatures for April.

State or Territory.	Station.	For 1886.		Since establishment of station.			
		Max.	Min.	Max.	Year.	Min.	Year.
Alabama	Mobile	84.0	37.0	90.0	1881, 1883	32.0	1881
Do	Montgomery	81.3	30.5	90.0	1880	30.0	1881
Arizona	Prescott	71.5	26.7	86.0	1879	13.0	1878
Do	Fort Apache	78.7	23.8	89.0	1879	15.0	1883
Arkansas	Fort Smith	85.9	30.1	88.5	1883	33.3	1884
Do	Little Rock	85.8	28.2	94.0	1880	39.0	1881
California	San Francisco	78.7	44.2	81.0	1875	40.0	1875
Do	San Diego	79.6	44.7	87.0	1876	39.0	1875
Colorado	Denver	74.6	30.5	83.0	1874	4.0	1876
Do	Pike's Peak	27.6	-4.2	39.0	1876	-31.0	1875
Connecticut	New Haven	81.3	35.8	83.0	1885	16.0	1874
Do	New London	77.4	31.5	77.9	1885	19.0	1874
Dakota	Fort Buford	78.6	10.7	92.0	1881	4.8	1884
Do	Yankton	80.1	3.9	89.0	1874	-3.0	1881
Delaware	Cape Henlopen	75.4	32.0				
Do	Del. Breakwater			79.0	1880	25.0	1881
District of Columbia	Washington City	88.1	34.5	90.0	1872	22.5	1875
Florida	Jacksonville	85.6	44.0	91.0	1874, 1880	37.0	1881
Do	Key West			91.0	1881	61.0	1873, 1881
Georgia	Atlanta	82.5	31.8	86.0	1880	25.0	1881
Do	Savannah	83.4	40.0	89.0	1873	33.0	1881
Idaho	Boise City	73.7	28.6	80.0	1879	23.0	1878
Do	Lewiston			86.0	1880	30.0	1880
Illinois	Chicago	80.5	29.0	89.0	1873	24.0	1875
Do	Chicago	81.3	23.1	83.0	1873	17.0	1875
Indiana	Indianapolis	84.0	24.5	85.3	1883	19.0	1875
Indian Territory	Fort Hill	84.0	27.0	90.0	1880	26.0	1881
Iowa	Dubuque			84.0	1879	14.0	1875
Do	Keokuk	81.9	23.7	85.0	1883	20.0	1875, 79, 81
Kansas	Dodge City	79.0	18.4	92.0	1880	13.0	1881
Do	Leavenworth	87.0	20.3	89.0	1880	13.0	1881
Kentucky	Louisville	85.3	29.7	88.5	1883	21.0	1875
Louisiana	New Orleans	85.3	41.0	86.0	1889	39.0	1881
Do	Shreveport	80.5	37.0	93.0	1880, 1882	32.0	1881
Maine	Eastport	71.3	37.0	80.2	1885	2.0	1874
Do	Portland	73.8	33.4	78.0	1881	14.0	1874
Maryland	Baltimore	73.8	33.4	84.0	1881	23.5	1875
Massachusetts	Boston	84.3	26.9	85.0	1872	11.0	1874
Michigan	Detroit	81.5	22.6	78.5	1883	8.0	1875
Do	Marquette	78.0	7.4	81.0	1877	3.0	1875
Minnesota	Duluth	69.7	9.7	75.0	1881	3.0	1874
Do	Saint Paul	81.3	33.5	82.0	1879, 1882	7.0	1874
Mississippi	Vicksburg	88.0	30.5	91.4	1885	31.0	1881
Missouri	Saint Louis	84.0	24.1	87.5	1883	22.0	1875
Montana	Fort Benton	78.3	19.3	87.0	1880	-6.0	1875
Do	Helena	71.3	27.2	73.0	1881	6.0	1881
Nebraska	North Platte	82.0	10.2	82.0	1880	18.0	1875
Do	Omaha	84.6	17.8	89.0	1880	6.0	1881
Nevada	Winnemucca	72.4	19.7	79.0	1881	18.0	1882
New Hampshire	Mount Washington	82.2	2.3	90.5	1885	-18.0	1874
New Jersey	Atlantic City	83.4	28.4	79.0	1878	19.0	1875
Do	Sandy Hook	80.0	31.0	80.5	1885	13.0	1874
New Mexico	Santa Fé	72.2	31.5	84.0	1879	11.0	1875
New York	Buffalo	77.6	24.5	82.0	1883	11.0	1881
Do	New York City	77.0	29.4	81.5	1884	20.0	1873
North Carolina	Charlotte	80.6	32.5	85.0	1880, 1881	28.0	1881
Do	Wilmington	86.7	39.4	90.0	1880	39.0	1875
Ohio	Cincinnati	82.9	25.4	85.0	1872, 1873	18.5	1875
Do	Toledo	82.9	21.3	85.0	1872	13.0	1875
Oregon	Portland	73.8	29.9	85.0	1880	28.0	1875
Do	Roseburg	73.5	21.1	84.5	1880	29.0	1878
Pennsylvania	Pittsburg	85.1	29.8	89.2	1885	14.0	1875
Do	Philadelphia	84.4	29.8	87.0	1872	17.5	1875
Rhode Island	Providence	80.7	31.9	86.9	1885	35.0	1881
South Carolina	Charleston	81.4	39.4	86.4	1884	34.0	1881
Tennessee	Knoxville	84.3	29.3	86.0	1872	24.0	1875, 1881
Do	Nashville	84.9	31.5	90.0	1872	25.0	1875
Texas	Fort Davis	84.3	23.8	95.0	1879	27.0	1884
Do	Galveston	80.4	43.8	85.0	1876	44.0	1873
Utah	Salt Lake City	71.5	39.4	83.0	1874	19.0	1875
Virginia	Lynchburg	88.6	31.0	91.5	1873	25.0	1881
Do	Norfolk	87.0	38.1	92.0	1871	27.0	1875, 1880
Washington Ter.	Dayton			91.0	1880	21.0	1880
Do	Olympia	72.5	30.1	82.0	1880	28.0	1880
Wisconsin	La Crosse	81.0	18.6	83.0	1879	10.0	1881
Do	Milwaukee	78.8	11.6	82.0	1871	12.0	1875
Wyoming	Cheyenne			80.0	1874	2.0	1875

Nebraska.—1st to 7th, 14th, 17th, 24th, 25th, 27th to 30th.

Nevada.—2d to 5th, 7th to 14th, 18th to 20th.

New Hampshire.—2d, 4th, 5th, 9th, 11th, 12th, 14th, 15th, 18th, 27th.

New Jersey.—4th, 9th, 18th, 30th.

New Mexico.—Puerto de Luna, 1st, 3d, 7th, 10th, 14th, 16th; Fort Stanton, 1st, 4th to 7th, 10th, 16th, 17th, 26th; Santa Fé, 22d, 26th.

New York.—1st to 11th, 28th, 29th, 30th.

North Carolina.—Weldon, 2d, 8th, 9th, 10th; Reidsville, 7th, 8th, 10th; Raleigh, 8th, 9th; Wilmington and Fort Macon, 9th; Lenoir, 20th.

Ohio.—1st to 11th.

Oregon.—3d, 4th, 13th, 18th to 23d, 26th to 30th.

Pennsylvania.—1st to 13th, 17th, 18th.

South Carolina.—Aiken and Spartanburg, 8th; Stateburg, 8th, 9th.

Tennessee.—Memphis, 1st, 3d to 8th; Nashville, 1st, 6th, 8th, 9th; Paris, 6th, 8th; Milan and Chattanooga, 8th; Knoxville, 8th, 9th.

Texas.—Comfort, 4th, 5th; Midland and Fort Davis, 4th, 5th, 6th; San Antonio and El Paso, 5th; Silver Falls and Abilene, 5th, 6th; Corsicana, 6th; Palestine, 6th, 7th.

Vermont.—9th, 15th, 17th, 18th, 25th, 30th.

Virginia.—Variety Mills, 2d, 7th, 10th, 19th; Lynchburg, 7th, 9th, 10th; Marion, 8th; Dale Enterprise, 8th, 9th; Norfolk, Bird's Nest, University of Virginia, and Fort Myer, 9th.

Washington Territory.—4th, 5th, 11th, 12th, 14th, 20th, 21st, 24th, 25th.

West Virginia.—1st, 9th, 10th, 18th, 19th.

Wisconsin.—1st to 13th.

ICE.

Ice formed in the southern parts of the country during the month, as follows:

Atlanta, Georgia, 6th, 8th.

Forsyth, Georgia, 1st, 6th, 7th, 8th.

Nashville, Tennessee, 1st, 6th.

Milan, Tennessee, 1st, 4th.

Knoxville, Tennessee, 6th.

Ashwood, Tennessee, 1st, 6th, 8th.

Paris, Tennessee, 6th.

Wellington, Kansas, 3d, 4th, 5th, 6th, 7th.

Fort Scott, Kansas, 4th.

Lenoir, North Carolina, 1st.

Weldon, North Carolina, 8th, 9th.

Reidsville, North Carolina, 7th, 8th.

Variety Mills, Virginia, 9th.

PRECIPITATION.

[Expressed in inches and hundredths.]

The distribution of rainfall over the United States and Canada for April, 1886, as determined from the reports from more than seven hundred stations, is exhibited on chart iii.

In the following table are shown, for the several geographical districts, the normal precipitation for April; the average for April, 1886, and the excess or deficiency as compared with the normal:

Average precipitation for April.

Districts.	Average for April, Signal-Service observations.		Comparison of April, 1886, with the average for several years.
	For several years.	For 1886.	
	Inches.	Inches.	Inches.
New England	3.96	3.34	-0.72
Middle Atlantic States	3.17	2.93	-0.24
South Atlantic States	4.38	2.89	-1.49
Florida Peninsula	2.77	3.32	+0.55
Eastern Gulf States	5.85	6.10	+0.25
Western Gulf States	4.81	4.34	-0.47
Rio Grande Valley	0.86	0.14	-0.72
Tennessee	5.67	3.70	-1.91
Ohio Valley	3.48	3.82	+0.34
Lower lake region	2.32	2.94	+0.62
Upper lake region	2.27	2.62	+0.35
Extreme northwest	1.85	3.20	+1.41
Upper Mississippi Valley	3.05	3.27	+0.22
Missouri Valley	3.30	2.97	-0.33
Northern slope	1.58	2.71	+1.13
Middle slope	1.77	2.68	+0.91
Southern slope	1.16	0.63	-0.53
Southern plateau	0.45	0.55	+0.10
Middle plateau	1.78	2.90	+1.12
North Pacific coast region	3.45	4.06	+0.61
Middle Pacific coast region	2.79	4.49	+1.70
South Pacific coast region	0.99	1.86	+0.87

The precipitation for April, 1886, has been in excess of the average on the Pacific coast south of Washington Territory, in the Rocky Mountain regions, extreme northwest, Lake region, and over portions of Florida, the middle Atlantic, and east Gulf states. In the lower Missouri valley, southern slope, west Gulf states, Tennessee, and in the districts on the Atlantic coast north of Florida, except northern New Jersey, the precipi-

tation is below the average. The most marked deficiency occurred in Tennessee and the south Atlantic states, and the greatest excess occurred in the extreme northwest, northern slope, middle plateau, and middle Pacific coast region.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows, for certain stations, as reported by voluntary observers, the average precipitation for the month of April for a series of years; the precipitation for April, 1886; and the departures from the average:

Station.	County.	Average pre- cipitation for April.	Number of years.	Precipitation for April, 1886.	Departure.
<i>Arkansas.</i>		<i>Inches.</i>		<i>Inches.</i>	<i>Inches.</i>
Lead Hill.....	Boone.....	4.91	4	5.44	+ 0.53
<i>California.</i>					
Sacramento.....	Sacramento.....	2.53	12	4.12	+ 1.59
<i>Connecticut.</i>					
Hartford.....	Hartford.....	3.19	14	3.35	+ 0.16
Middletown *.....	Middlesex.....	3.26	26	3.43	+ 0.17
New Haven *.....	New Haven.....	4.02	14	3.21	- 0.81
Wallingford *.....	New Haven.....	3.75	29	4.20	+ 0.45
<i>Dakota.</i>					
Webster.....	Day.....	3.92	3	7.72	+ 3.80
<i>Illinois.</i>					
Anna.....	Union.....	4.14	11	3.45	- 0.69
Mattoon.....	Coles.....	3.80	6	2.30	- 1.50
Peoria.....	Peoria.....	3.17	3	2.75	- 0.42
Riley.....	McHenry.....	2.70	25	3.76	+ 1.06
Sycamore.....	De Kalb.....	4.47	4	5.14	+ 0.67
<i>Indiana.</i>					
Lafayette.....	Tippecanoe.....	3.33	7	1.80	- 1.53
Logansport.....	Cass.....	3.18	31	2.20	- 0.98
Spiceland.....	Henry.....	3.82	26	2.20	- 1.62
Vevay.....	Switzerland.....	3.49	21	2.55	- 0.94
<i>Iowa.</i>					
Cresco.....	Howard.....	2.08	10	2.37	+ 0.29
Monticello.....	Jones.....	2.59	33	1.80	- 0.79
<i>Kansas.</i>					
Independence.....	Montgomery.....	4.55	14	4.98	+ 0.43
Wellington.....	Sumner.....	2.88	8	3.25	+ 0.37
Yates Centre.....	Woodson.....	2.30	6	1.70	- 0.60
<i>Maine.</i>					
Cornish.....	York.....	2.72	29	3.08	+ 0.36
Gardiner.....	Kennebec.....	3.37	45	1.43	- 1.94
Orono *.....	Penobscot.....	2.92	18	1.80	- 1.12
<i>Maryland.</i>					
Fallston.....	Harford.....	3.18	15	2.53	- 0.65
<i>Massachusetts.</i>					
Amherst *.....	Hampshire.....	3.20	51	2.06	- 1.14
Cambridge *.....	Middlesex.....	3.71	45	2.07	- 1.64
Chestnut Hill *.....	Middlesex.....	3.52	11	2.71	- 0.81
Framingham *.....	Middlesex.....	3.28	12	2.05	- 1.23
Lake Cochituate *.....	Middlesex.....	4.08	35	2.00	- 2.08
Lowell *.....	Middlesex.....	3.63	60	1.56	- 2.07
Lynn *.....	Essex.....	3.53	12	1.83	- 1.70
Mystic Lake *.....	Middlesex.....	3.22	11	2.29	- 0.93
New Bedford *.....	Bristol.....	3.95	73	2.19	- 1.76
Somerset.....	Bristol.....	3.97	10	2.08	- 1.89
Springfield *.....	Hampden.....	3.35	39	2.56	- 0.79
Taunton *.....	Bristol.....	3.53	12	2.40	- 1.13
Waltham *.....	Middlesex.....	3.73	62	2.51	- 1.22
Williamstown *.....	Berkshire.....	2.38	21	1.56	- 0.82
Worcester.....	Worcester.....	3.65	46	2.26	- 1.39
<i>Nevada.</i>					
Carson City.....	Ormsby.....	1.53	7	0.25	- 1.28
<i>New Brunswick.</i>					
Saint John.....	Saint John.....	3.10	26	0.89	- 2.21
<i>New Hampshire.</i>					
Concord *.....	Merrimack.....	2.94	31	1.66	- 1.28
Hanover *.....	Grafton.....	1.97	21	1.11	- 0.86
<i>New Jersey.</i>					
South Orange.....	Essex.....	2.96	16	3.00	+ 0.04
<i>New York.</i>					
North Volney.....	Oswego.....	2.12	14	2.15	+ 0.03
Palermo.....	Oswego.....	2.40	33	2.13	- 0.27
Plattsburg Barracks.....	Clinton.....	1.59	17	2.06	+ 0.47
<i>Ohio.</i>					
Wauseon.....	Fulton.....	2.47	13	3.19	+ 0.72
<i>South Carolina.</i>					
Kirkwood.....	Kershaw.....	3.54	21	2.01	- 1.53
Stateburg.....	Sumpter.....	2.77	6	1.41	- 1.36
<i>Texas.</i>					
New Ulm.....	Austin.....	4.10	14	2.01	- 2.09
<i>Vermont.</i>					
Lunenburg *.....	Essex.....	2.74	38	0.75	- 1.99
Strafford.....	Orange.....	2.31	12	2.60	+ 0.29
<i>Virginia.</i>					
Bird's Nest.....	Northampton.....	3.33	18	2.05	- 1.28
Dale Enterprise.....	Rockingham.....	4.11	6	3.90	- 0.21
Variety Mills.....	Nelson.....	2.66	7	3.15	+ 0.49
Wytheville.....	Wythe.....	3.62	22	3.99	- 0.21
<i>West Virginia.</i>					
Helvetia.....	Randolph.....	4.00	10	3.44	- 0.56

* From the "Bulletin of the New England Meteorological Society."

In connection with this subject, the following notes from voluntary observers are interesting:

Illinois.—Mattoon, Coles county: the snowfall for April, 1.30, is about twice the average for six years.

Indiana.—Logansport, Cass county: the average snowfall for April during

a period of thirty-one years is 1.56. The total snowfall for this month is 5.06 above the average.

Vevay, Switzerland county: the greatest precipitation in any April for twenty-one years was 7.18, in 1872; least was 0.98, in 1882. The snowfall for the present April, 5.10, is the greatest amount that has fallen during the same month for twenty-one years. Four inches fell in 1874.

Spiceland, Henry county: the mean snowfall during April for twenty-seven years, is 2.10; total for this month, 5.60.

Iowa.—Monticello, Jones county: the greatest precipitation in April during thirty-three years was 5.78, in 1862; least, 0.63, in 1863.

Kansas.—Wellington, Sumner county: the greatest April precipitation during a period of eight years was 4.84, in 1885; least, 0.54, in 1880.

Maine.—Gardiner, Kennebec county: the greatest April precipitation during the last forty-eight years was 6.53, in 1884; least, 0.65, in 1844.

Cornish, York county: the total snowfall for April, 1886, is eight inches below the average for the past twenty-nine years.

Maryland.—Fallston, Harford county: the greatest precipitation for April in fifteen years, 8.11, occurred in 1874; least, 1.28, in 1881.

Massachusetts.—Worcester, Worcester county: the precipitation (rain and snow melted) for April was 2.26 inches, and snow 1.34 inches, against 2.83 inches of rain and no snow during the corresponding period last year. The aggregate precipitation for the first quarter of 1886 is 18.66 inches, against 12.23 inches during same period last year. The aggregate snowfall for the winter of 1885-'86, is 42.5 inches, against 49.6 inches during the season of 1884-'85.

New York.—Palermo, Oswego county: the largest April precipitation during the previous thirty-three years was 6.20, in 1863; the smallest, 0.20, in 1879.

North Volney, Oswego county: the greatest precipitation in April during the past fourteen years was 3.65, in 1874; least, 0.65, in 1879.

Ohio.—Wauseon, Fulton county: the greatest April precipitation in the preceding thirteen years was 4.81, in 1880; least, 1.31, in 1872.

Texas.—New Ulm, Austin county: the largest precipitation in any April during the preceding fourteen years was 8.00, in 1873; smallest, 1.08, in 1876.

Vermont.—Strafford, Orange county: the greatest April precipitation in the past twelve years was 5.20, in 1878; least, 0.60, in 1881.

Virginia.—Variety Mills, Nelson county: greatest April precipitation in seven years was 4.29, in 1883; least, 1.39, in 1885.

The following are some of the most marked departures from normal precipitation at Signal Service stations:

Above normal.		Below normal.	
	<i>Inches.</i>		<i>Inches.</i>
Moorhead, Minnesota.....	3.74	Memphis, Tennessee.....	3.51
San Francisco, California.....	3.09	Charleston, South Carolina.....	3.48
Vicksburg, Mississippi.....	2.93	Nashville, Tennessee.....	3.17
Duluth, Minnesota.....	2.89	Little Rock, Arkansas.....	3.15
Pike's Peak, Colorado.....	2.83	Eastport, Maine.....	2.66
Sanford, Florida.....	2.65	Atlanta, Georgia.....	2.56
Fort Smith, Arkansas.....	2.43	Savannah, Georgia.....	2.48
Roseburg, Oregon.....	2.20	Augusta, Georgia.....	2.47

SNOW.

The dates on which snow fell in the various states and territories are as follows:

Alabama.—Birmingham, 6th.

Arizona.—Willcox, 11th; Prescott, 11th, 12th, 13th, 19th; Fort Grant, 12th.

Arkansas.—Little Rock and Fort Smith, 4th, 5th.

California.—Susanville, 1st, 2d, 11th; Fort Bidwell, 2d, 3d, 11th, 13th, 14th.

Colorado.—Pike's Peak, 1st to 5th, 8th, 9th, 12th to 16th, 19th to 23d; at other places in the state on the 2d to 5th, 8th, 13th to 29th.

Connecticut.—3d, 4th, 5th.

Dakota.—1st, 2d, 3d, 19th, 23d, 25th to 29th.

Idaho.—17th, 30th.

Illinois.—1st to 4th, 6th.

Indiana.—1st to 7th.

Indian Territory.—Fort Reno, Fort Supply, and Fort Sill, 4th.

Iowa.—1st, 3d, 30th.

Kansas.—1st to 6th, 8th, 15th.

Kentucky.—Louisville, 1st, 5th, 6th, 7th.

Maine.—6th, 7th, 8th.

Maryland.—Fallston, 4th.

Massachusetts.—3d, 4th, 7th, 8th, 10th.

Michigan.—1st, 2d, 6th, 7th, 8th, 10th, 11th, 24th.

Minnesota.—1st, 23d, 27th, 28th, 29th.

Missouri.—Saint Louis, 2d, 3d, 4th; Conception, 3d.

Montana.—2d, 4th, 10th, 14th, 15th, 17th, 22d, 24th, 25th, 27th, 28th, 30th.

Nebraska.—1st to 4th, 24th, 25th, 26th, 28th, 29th.

Nevada.—1st, 2d, 3d, 6th, 7th, 8th, 12th, 13th.

New Hampshire.—Mount Washington, 2d, 6th, 7th, 8th, 10th, 12th, 28th, 29th; at other places in the state on the 3d, 5th to 8th.

New Jersey.—4th, 5th.

New Mexico.—Gallinas Spring, 4th; Santa Fé, 4th, 8th, 12th; Fort Wingate, 8th, 13th, 19th, 24th; Fort Union, 12th.

New York.—1st to 8th, 19th, 20th.

North Carolina.—Fort Macon, 30th.

Ohio.—1st to 7th.

Oregon.—1st, 2d, 3d, 9th to 13th, 16th, 17th, 29th, 30th.

Pennsylvania.—1st to 7th.

Rhode Island.—3d, 4th, 5th.

Tennessee.—Chattanooga and Ashwood, 5th; Knoxville, 5th, 6th; Nashville, 5th, 7th.

Texas.—Fort Elliott, 4th.

Utah.—Salt Lake City, 2d, 3d, 4th, 8th, 14th, 18th.

Vermont.—6th, 7th, 8th.

Virginia.—Norfolk, 3d; Lynchburg, 7th.

Washington Territory.—12th, 29th, 30th.

West Virginia.—Parkersburg, 2d, 3d, 5th, 6th.

Wisconsin.—1st, 2d.

Wyoming.—1st to 5th, 8th, 11th, 13th, 17th, 18th, 19th, 24th, 26th, 27th.

Snow storms of unusual severity for this month, were reported, as follows:

East Saginaw, Saginaw county, Michigan: a very heavy snow storm, accompanied by high wind, occurred on the 6th.

Port Huron, Saint Clair county, Michigan: the severest snow and wind storm of many years set in at three o'clock on the morning of the 6th and rapidly grew worse; a foot of snow fell and drifted badly; business was almost entirely suspended and trains were unable to leave the town.

Lansing, Michigan: the worst snow storm of the year visited this place on the 6th; railroad traffic was seriously impeded, and all trains were late. The wind blew a gale all day, doing much damage to fences, smoke-stacks, and other property.

Hillsdale, Hillsdale county, Michigan: on the 6th about two feet of snow fell and drifted badly; country travel was suspended; all trains were delayed.

Ann Arbor, Washtenaw county, Michigan: the storm reached here early on the morning of the 6th; the snowfall was heavy and, being accompanied by a gale having a maximum velocity of thirty-five miles per hour, drifted badly, in some places six feet deep.

Pontiac, Oakland county, Michigan: the worst "blizzard" for years prevailed during the 6th, the snow being five and six feet deep on the main street; trains were all behind time.

Adrian, Lenawee county, Michigan: a strong north wind, with accompanying snow, set in on the night of the 5th and continued without intermission during the 6th; the storm was the severest seen here in ten years, and was notable because it was so late in the season and followed an unusually mild and open winter; business and travel were suspended, owing to high drifts.

Detroit, Michigan: the snow storm of the 6th was undoubtedly the worst experienced in this state for many years. Early in the morning several attempts were made to run street cars, but the snow drifted so rapidly that it became impossible to keep the tracks clear, and the cars snowed up at various points on nearly all the lines in the city. At ten o'clock fourteen inches had fallen on a level. The entire southern part of the state was covered with snow.

Cincinnati, Ohio: a heavy snow storm set in on the afternoon of the 5th and continued during the 6th; eight inches of snow fell.

Cleveland, Ohio: a raw north wind on the 5th brought with it a storm of snow as evening set in, which continued during the 6th, impeding travel on street car lines and delaying telegraphic communication.

Toledo, Ohio: a heavy snow storm set in just before midnight of the 5th; snow to the depth of ten inches fell, and the heavy gale caused much drifting; the streets were almost impassable, and street car lines were frequently blocked.

Coshocton, Coshocton county, Ohio: a heavy snow storm prevailed almost incessantly for two days—the 5th and 6th. The snow rapidly disappeared, causing the rivers to rise fast; fears were entertained of another flood like that of 1884.

Pittsburg, Pennsylvania: rain and snow fell without interruption for twenty-four hours on the 6th, covering the sidewalks with sleet and interrupting all kinds of travel.

Toronto, Canada: the greatest snow storm within the recollection of the inhabitants occurred here on the 6th.

Oakville, Ontario, Canada: the severest storm of snow and wind ever experienced here occurred on the 6th; the lighthouse, several piers, and numerous boat houses were swept away; the loss will reach thousands of dollars.

LARGEST MONTHLY SNOWFALLS.

[Expressed in inches and tenths.]

Monthly snowfalls of two inches or more were reported from the various states and territories during the month, as follows:

Arizona.—Prescott, 7.5.

California.—Susanville, 5.5; Fort Bidwell, 3.9.

Colorado.—Pike's Peak, 61.2; West Las Animas, 3.5; Denver, 2.

Connecticut.—Norfolk, 4; Collinsville, 3.2; New London, 2.8; Hartford, 2.5; North Colebrook, 2.3; New Haven, 2.1.

Dakota.—Deadwood, 7.6; Webster, 4.4.

Illinois.—Windsor, 5.2; Rockford, 5.

Indiana.—Farmland, 17.5; Collinsville, 12.5; La Grange, Fort Wayne, and Sunman, 12; Greencastle, 11.1; Butlerville and Franklin, 11; Mauzy and Princeton, 9; Blue Lick, 8.5; Worthington, 8; Knightstown, 7.8; Brookville, 7.5; Indianapolis, 6.9; Logansport and Greenfield, 6.5; Spiceland, 5.6; Vevay, 5.1; Columbus and Marion, 5; Delphi, 4.5; Lafayette, 2.8; Marengo, 2.5.

Iowa.—Keokuk, 2.3.

Kansas.—Westmoreland and Wakefield, 7; Concordia, 5.2; Manhattan a and Manhattan b, 5; Atchison, 4; Topeka, Salina, Wyandotte, West Leavenworth, and Sterling, 3.

Kentucky.—Frankfort, 5.8; Louisville, 2.2.

Maine.—Bridgeton, 6; Gardiner and Mayfield, 3; Solon, 2.5; Buckfield and Belfast, 2.

Maryland.—Cumberland, 2.

Massachusetts.—Fall River, Dudley, and Gilbertville, 3; Fitchburg, 2.2.

Michigan.—Detroit, 26.3; Hudson, 15.5; Thornville, 15; Port Huron, 13; Birmingham, 6 to 8; Lansing, 3.5; Marquette, 3.1; Traverse City and Harrisville, 3; Kalamazoo and Pentwater, 2.

Minnesota.—Grand Forks, 3; Saint Vincent, 2.3.

Missouri.—Saint Louis, 6.5; Central College, 5.2.

Montana.—Fort Benton, 7; Fort Shaw, 5.5; Fort Assinaboine, 4.7.

Nebraska.—North Platte, 14.8; Hay Springs, 3.5; Stromsburg, 3; Valentine, 2.6; Crete, 2.3; Marquette and Central City, 2.

Nevada.—Winnemucca, 2.2; Halleck, 2.

New Brunswick.—Parker's Ridge, 6.

New Hampshire.—Mount Washington, 14.9; Berlin Mills, 5.2; Walpole, 2.8; Antrim and Littleton, 2.

New Jersey.—Beverly, 4; Princeton, 3; Moorestown, 2.2.

New York.—Buffalo, 11.4; Rochester, 7; Humphrey, 5.2; Palermo, 4.5; Ithaca, 3.5; Mountainville, 3; Factoryville, 2.4; Cooperstown, 2.

North Carolina.—Kitty Hawk, 2.8.

Ohio.—Jacksonborough, 22; College Hill, 19.5; Columbus, 16.9; Wauseon, 16.5; Sandusky, 14; Yellow Springs, 13.8; Ruggles and West Milton, 13; Napoleon, 12 to 15; North Lewisburg a, 13; North Lewisburg b, 12; Cleveland, 11.5; Hiram, 11; Tiffin, 10.8 to 15; Westerville, 10; Toledo, 9.8; Fostoria, 9.5; Garrettsville, 8.8; Cincinnati, 5.5; Cleveland, 4.

Pennsylvania.—Grampian Hills, 9; Pittsburg, 5.4; Troy, 5; Catawissa, 4; Wellsborough, 3.8; Erie, 3.4; Fallsington, 2.8.
Utah.—Salt Lake City, 3.2.

Vermont.—Stowe, 20; Marlborough, 8.6; Vernon, 8.4; Brattleborough, 7; Townshend, 6.2; Chelsea and Jacksonville, 5; Lunenburg, 4; Dorset, 3.9; Newport, Strafford, Burlington, Poultney, and Windsor, 3.

Virginia.—Marion, 2.5.

West Virginia.—Parkersburg, 8; Helvetia, 6.

Wisconsin.—Milwaukee, 2.5.

Wyoming.—Fort Bridger, 10.8.

SNOW ON GROUND AT END OF MONTH.

The only station reporting snow on the ground at the end of month was Pike's Peak, Colorado, where snow remained to a depth of 20 inches.

HAIL.

Hail was reported to have fallen in the various states and territories as follows:

Arizona.—Fort Verde, 13th.

Arkansas.—Fort Smith, 25th.

California.—Sacramento and Susanville, 10th; Nicholas, 10th, 13th; Sacramento, 12th; Red Bluff and Princeton, 13th.
Colorado.—Colorado Springs, 12th; Fort Lewis, 19th, 23d; Pueblo and West Las Animas, 21st; Montrose, 21st, 25th.

Connecticut.—North Colebrook, 13th.

Dakota.—Bismarck and Fort Totten, 14th.

Idaho.—Boisé City, 17th; Fort Cœur d'Alene, 28th.

Illinois.—Cairo and Charleston, 26th.

Indiana.—Vevay, 1st, 3d; Jeffersonville, 2d; Knightstown, 15th, Sunman, 20th.

Indian Territory.—Fort Reno, 9th.

Iowa.—Oskaloosa a, 14th; Oskaloosa b, 14th, 15th; Muscatine and Cresco, 16th; Des Moines, 17th; Logan, 30th.

Kansas.—Ninnescah, 2d; Yates Centre, 2d, 23d; Allison, 12th; Wyandotte, 13th, 15th; Westmoreland and Fort Scott, 14th; Independence, 14th, 25th, 28th; Emporia, Topeka a and Topeka b, 15th; Salina, 22d.

Kentucky.—Louisville, 15th.

Louisiana.—Shreveport, 17th, 27th.

Maine.—Gardiner and Buckfield, 6th; Cornish, 6th, 7th.

Michigan.—Fort Brady, 22d.

Minnesota.—Saint Paul and Fort Snelling, 14th; Saint Vincent, 21st; Duluth, 26th.

Missouri.—Conception, 15th.

Montana.—Fort Custer, 30th.

Nebraska.—Crete, 9th, 16th; Omaha, 14th; Fairbury, Fort Robinson, and De Soto, 28th.

New Hampshire.—Mount Washington, 19th.

New Jersey.—Clayton, 4th; Readington, 12th, 24th.

New Mexico.—Fort Union, 11th, 20th, 24th; Fort Wingate, 12th, 19th, 24th; Santa Fé, 21st; Gallinas Spring, 24th.

New York.—Setauket, 3d, 5th; Factoryville, 5th; Plattsburg Barracks, 6th; Mountainville, 10th; Madison Barracks, 29th.

North Carolina.—Wilmington, Charlotte, Lenoir, and Raleigh, 30th.

Ohio.—Jacksonborough, 20th; Hiram, 24th; Napoleon, 26th.

Oregon.—Ashland, 2d; Roseburg, 12th, 17th; Portland, 16th; East Portland, 16th, 28th, 29th; Astoria, 16th, 29th, 30th; Albany, 16th, 30th; Fort Klamath, 29th; Bandon, 30th.

Pennsylvania.—Dyberry, 5th, 20th, 29th; Fallsington, 6th; Drifton and Philipsburg, 20th; East Brook, 24th.

South Carolina.—Spartanburg, 3d, 4th, 21st; Stateburg, 30th.

Tennessee.—Nashville, 3d.

Texas.—Silver Falls, 11th, 12th, 22d; Fort Elliott, 23d.

Virginia.—Fort Myer, 6th.

Washington Territory.—Olympia, 13th; Spokane Falls, 15th; Bainbridge Island, 16th, 17th; Neah Bay, 16th, 17th, 29th; Tacoma, 29th; Pleasant Grove, 30th.

West Virginia.—Parkersburg, 20th.

Wisconsin.—La Crosse, 16th.

Wyoming.—Fort Fred Steele, 23d.

Table of excessive and greatest monthly precipitation for April, 1886.

Station.	Specially heavy.		Largest monthly.	Amount.	Station.	Specially heavy.		Largest monthly.	Amount.
	Date.	Amt.				Date.	Amt.		
Alabama.					Louisiana—Con.				
Evergreen.....	17	4.53	10.30		Cheneyville *.....	16, 17	2.08		
Do.....	26, 27, 28	4.55			Do *.....	27, 28	3.70		
Bermuda.....	17	3.70	9.10		Amite City *.....	26, 27, 28	7.55		
Do.....	26, 27, 28	3.80			Alexandria *.....	16, 17	2.61		
Carrollton.....	25, 27, 28	4.23	8.07		Do *.....	27	3.14		
Grove Hill.....	17	2.00	7.75		Maine.				
Do.....	27, 28	3.70			Cornish.....	7	2.25		
Montgomery.....	27, 28	4.08	7.38		Portland.....	6	2.06		
Marion.....	26, 27, 28	3.55	7.37		Massachusetts.				
Mt. Vernon B'ks.....	26, 27	3.84	7.11		Milton.....	6, 7	3.44		
Greensborough.....	26, 27, 28	2.83	6.97		Michigan.				
Mount Willing.....	26, 27, 28	3.75	6.25		Detroit.....	6	2.41		
Newton.....	4, 5	2.00	6.25		Minnesota.				
Do.....	26, 27, 28	4.25			Northfield.....	14	2.95	7.31	
Selma.....	27, 28	3.00			Duluth.....	14, 15	2.43		
Trinity.....	4, 5	2.20			Mississippi.				
Prattville.....	29	2.00			Vicksburg.....	26, 27	3.97	9.99	
Birmingham.....	5	2.01			Brookhaven *.....	25 to 28	8.87		
Do.....	28, 29	2.05			Batesville *.....	26, 27	2.55		
Livingston *.....	26, 27, 28	3.98			Grenada *.....	17	2.00		
Fort Deposit *.....	28	2.09			Jackson *.....	25 to 28	6.66		
Mobile.....	26, 27, 28	3.85			Edwards *.....	25 to 28	7.56		
Eastman *.....	28	2.00			Lake *.....	25 to 28	6.06		
Pine Apple *.....	17, 18	3.27			Waynesborough *.....	26, 27, 28	7.44		
Do.....	26, 27, 28	4.71			Port Gibson *.....	25 to 28	6.56		
Centre.....	4, 5	2.00			Oxford *.....	25, 26	2.04		
Greenville *.....	18	2.25			Natchez.....	16	2.84		
Do.....	27, 28	2.45			Do.....	27, 28	6.07		
Fayette.....	26, 27, 28	3.15			Okolona *.....	28	2.00		
Selma *.....	26, 27, 28	3.15			Meridian *.....	26, 27, 28	2.42		
Gadsden.....	4, 5	2.40			Macon *.....	17	2.00		
Arkansas.					Do.....	26, 27, 28	3.80		
Fort Smith.....	25	2.32	7.29		Holly Springs *.....	17	2.20		
Lead Hill.....	25	2.45			Hazlehurst *.....	27, 28	8.03		
California.					Columbus *.....	10, 17	2.51		
Fort Gaston.....	15, 16	3.99	9.23		New Hampshire.				
Hydesville.....	1, 2	2.13	9.15		Lake Village.....	5, 6	2.10		
Do.....	15, 16	2.31			Wolfborough.....	5, 6	2.05		
San Rafael.....	10, 11	2.58	8.30		New Jersey.				
Santa Cruz.....			7.60		Egg Harbor City.....	4, 5, 6	8.45	9.20	
Aptos.....			7.10		Dover.....	6	2.60		
Murieta.....	11	2.44			Paterson.....	6	2.84		
Presidio of San Francisco.....	9, 10	2.76			Beverly.....	5, 6	2.92		
Colorado.					South Orange.....	6	2.65		
Pike's Peak.....	19, 20	3.12	6.33		Sandy Hook.....	5, 6	3.04		
Salida.....	18, 19, 20	3.07			New Mexico.				
Montrose.....	19, 20	2.00			Fort Union.....	19, 20	3.00		
Colorado Springs.....	18 to 21	4.23			New York.				
Connecticut.					Setauket.....	6	2.86		
Hartford.....	5, 6	2.32			Penn Yan.....	6	2.89		
Dakota.					Auburn.....	6	2.50		
Webster.....	26, 27	3.44	7.72		Fort Columbus.....	4, 5, 6	2.98		
Do.....	29	2.59			New York.....	6	3.49		
Deadwood.....	22, 23, 24	4.67	6.72		Albany.....	6	3.02		
Huron.....	25, 26	2.54			Oswego.....	6	2.19		
Yankton.....	28	2.14			Rochester.....	6, 7	2.22		
Vermillion.....	25, 26	2.00			North Carolina.				
Dist. of Columbia.					Chapel Hill.....	29	2.62		
Kendall Green.....	5	3.25			Kitty Hawk.....	6	2.38		
Receiving Res' voir.....	5, 6	2.20			Raleigh *.....	29	2.06		
Distrib'g Res' voir.....	1	2.40			Goldsbrough *.....	28, 29	2.52		
Do.....	5, 6	2.41			Ohio.				
Florida.					Napoleon.....	5, 6	3.00		
Merritt's Island.....	18	3.05	8.90		Wauson.....	6	2.15		
Do.....	28, 29	3.00			Washington C. H.....	12	3.80		
Pensacola.....	17, 18	2.48	6.85		Weymouth.....	7	3.00		
Sanford.....	17, 18	2.48	6.60		Pennsylvania.				
Do.....	28, 29	2.88			Wellsborough.....	4 to 7	9.15?	10.77?	
Archer.....	28	2.18			Bethlehem.....	5, 6	2.22		
Fort Meade.....	29	2.00			Franklin.....	6	2.74		
Georgia.					West Chester.....	6	2.05		
Athens.....	28, 29	2.75			Pittsburg.....	5, 6	2.54		
Smithville *.....	28	2.41			Fallsington.....	5, 6	2.52		
Fort Gaines *.....	28	2.88			Rhode Island.				
Illinois.					Block Island.....	6	2.45		
Cairo.....	2, 3	2.48	6.64		Tennessee.				
Do.....	16, 17	3.45			Greenville.....	4, 5, 6	3.15	6.25	
Indiana.					Do.....	28, 29, 30	3.30		
Lafayette.....	11, 12	2.23			Huntingdon.....	16, 17	2.07		
Kansas.					Milan.....	16, 17	2.25		
Manhattan a.....	10	2.70			Chatanooga.....	4, 5	2.68		
Manhattan b.....	10	2.42			Knoxville.....	4, 5	3.29		
Independence.....	14, 15	2.77			Trenton.....	16, 17	2.39		
Kentucky.					Rogersville.....	5	2.20		
Frankfort.....	12	2.95			Jonesborough.....	5, 6	2.32		
Richmond.....	12	2.25			Andersonville.....	5	2.21		
Louisiana.					Parkville.....	4, 5	2.55		
Grand Coteau.....	27, 28	3.78	8.04		Grief.....	4, 5	2.15		
Luling.....	4	2.65	6.41		Brownsville *.....	16, 17	3.38		
Do.....	27	2.34			Paris *.....	16, 17	2.23		
New Orleans.....	27, 28	2.82			Texas.				
Monroe *.....	25, 26, 27	4.12			Belton.....	13	2.00		
Opelousas *.....	23	2.30			Weimar *.....	15	3.00		
Natchitoches *.....	27	2.32			Virginia.				
Lafayette *.....	16	2.51			Wytheville.....	5, 6	3.07		
Do *.....	27, 28	4.64			Lynchburg.....	4, 5	2.14		
					Norfolk.....	5, 6	2.15		

* Cotton-belt stations, where observations were begun April 10th.

SLEET.

Sleet occurred in the various states and territories, as follows:

Alabama.—Birmingham, 6th.
 Arkansas.—Lead Hill, 3d.
 Colorado.—West Las Animas, 3d; Pike's Peak, 12th, 19th.
 Dakota.—Fort Sisseton, 26th, 28th, 29th.
 Indiana.—Laconia, 3d.
 Kansas.—Fort Scott, 2d; El Dorado, 2d, 3d; Ninnescah, 3d.
 Kentucky.—Louisville, 2d.
 Maine.—Eastport, 6th, 7th; Bar Harbor, 7th.
 Massachusetts.—Heath, 6th; Princeton, 6th, 7th.
 Michigan.—Marquette, 24th.
 Missouri.—Springfield, Centreville, and Lamar, 3d.
 Nebraska.—Fort Niobrara, 25th, 28th.
 New Jersey.—Clayton, 4th; Beverly, 4th, 5th.
 New York.—Le Roy, Humphrey, and Rochester, 6th.
 Ohio.—Wauseon, 1st.
 Oregon.—Linkville, 1st.
 Pennsylvania.—Wellsborough and Philadelphia, 4th; Fallington and Pittsburg, 5th.
 Texas.—El Paso, 12th.

TEMPERATURE OF WATER.

The following table shows the highest and lowest temperatures of water observed at the several stations; the monthly ranges of water temperature; the average depth at which the observations were made; and the mean temperature of the air:

Temperature of water for April, 1886.

Station.	Temperature at bottom.		Range.	Average depth, feet and tenths.	Mean temperature of the air at station.
	Max.	Min.			
Atlantic City, New Jersey	55.9	41.8	14.1	9.5	48.0
Alpena, Michigan*	46.8	30.9	15.9	12.7	38.1
Augusta, Georgia	71.0	53.8	17.2	13.3	63.1
Baltimore, Maryland	63.3	44.8	18.5	10.3	54.6
Block Island, Rhode Island	47.5	36.5	11.0	8.1	45.2
Boston, Massachusetts	52.6	39.4	13.2	20.5	47.7
Buffalo, New York	53.7	38.1	15.6	9.6	46.3
Casby, Fort, Washington Ter	55.3	47.3	7.9	16.2	48.2
Cedar Keys, Florida	75.4	59.3	16.1	8.5	65.8
Charleston, South Carolina	68.9	58.7	10.2	38.0	62.4
Chicago, Illinois	53.7	35.6	18.1	8.1	49.1
Chincoteague, Virginia	63.1	46.8	16.3	3.8	51.9
Cleveland, Ohio*	57.7	35.3	22.4	14.0	49.1
Detroit, Michigan	51.3	32.3	19.0	26.8	50.6
Duluth, Minnesota					
Eastport, Maine	40.1	33.0	5.1	16.6	40.1
Escanaba, Michigan*	45.7	37.9	7.8	18.2	38.0
Galveston, Texas	75.0	59.3	15.7	13.0	66.5
Grand Haven, Michigan	66.0	36.6	29.4	19.0	47.3
Indianapolis, Texas*					
Jacksonville, Florida	75.7	64.0	11.7	18.0	66.5
Key West, Florida	81.0	73.3	7.7	19.5	74.5
Mackinaw City, Michigan*	37.9	33.3	4.7	10.0	38.0
Macon, Fort, North Carolina	67.8	57.5	10.3	10.8	56.6
Milwaukee, Wisconsin*	53.6	46.3	6.3	8.0	43.4
Mobile, Alabama	68.5	59.0	9.5	18.4	63.9
New Haven, Connecticut	54.0	39.0	15.0	16.6	45.3
New London, Connecticut	49.5	37.6	11.9	12.7	45.1
New York City	52.5	40.0	12.5	18.5	50.3
Norfolk, Virginia	68.7	47.2	21.5	15.8	56.1
Pensacola, Florida	70.9	61.2	9.7	17.8	65.3
Portland, Maine	48.4	35.8	12.6	16.1	44.7
Portland, Oregon	54.9	48.9	6.0	51.1	49.9
Sandusky, Ohio	61.0	33.8	27.2	10.8	48.3
Sandy Hook, New Jersey	51.3	37.5	13.8	13.3	48.7
San Francisco, California					
Savannah, Georgia	70.3	58.1	12.2	10.1	64.7
Smithville, North Carolina	69.4	57.6	11.8	10.8	60.9
Toledo, Ohio	70.4	34.2	36.2	13.1	49.0
Wilmington, North Carolina	70.0	56.3	14.3	11.5	62.1

* Observations interrupted by ice; see text. † Observations temporarily suspended.

Observations were interrupted by ice throughout the month at Duluth, Minnesota. Observations were also interrupted by ice at Mackinaw City, Michigan, from the 1st to the 26th; Escanaba, Michigan, from the 1st to 25th; Alpena, Michigan, from the 1st to the 6th.

WINDS.

The most frequent directions of the wind during April, 1886, are shown on chart ii by the arrows flying with the wind; they are also given in the tables of miscellaneous meteorological data. In the Lake region, and along the Atlantic coast from Boston, Massachusetts, to Key West, Florida, the prevailing winds were mostly from the northeast; in the Gulf States

and southern half of the Mississippi Valley they were generally from the southeast; in the north Pacific coast region they were southerly, while along the coast of California they were northwesterly. In the Rocky Mountain districts they were variable.

HIGH WINDS.

[In miles per hour.]

Wind-velocities of fifty or more miles per hour were reported during the month, as follows:

Mount Washington, New Hampshire, 110, sw., 1st; 80, nw., 2d; 72, nw., 3d; 90, se., 6th; 53, se., 7th; 77, nw., 9th; 80, nw., 10th; 70, nw., 11th; 62, w., 12th; 60, nw., 13th; 56, nw., 21st; 50, w., 22d; 82, w., 23d; 78, w., 24th; 50, nw., 26th.

Pike's Peak, Colorado, 88, w., 7th; 54, sw., 18th; 52, nw., 26th; 64, w., 27th; 52, nw., 29th.

Cape Mendocino, California, 60, se., 1st; 57, se., 8th; 70, se., 9th; 56, se., 12th; 65, se., 14th; 65, se., 15th; 80, se., 16th.

Valentine, Nebraska, 52, s., 21st; 52, n., 25th; 50, n., 26th.

West Las Animas, Colorado, 50, s., 8th.

Dodge City, Kansas, 52, se., 22d.

Eastport, Maine, 70 (estimated), ne., 7th.

Boston, Massachusetts, 51, e., 6th.

Fort Maginnis, Montana, 62, nw., 15th.

Sandy Hook, New Jersey, 60, e., 6th.

Fort Elliott, Texas, 50, se., 23d.

LOCAL STORMS AND TORNADOES.

Los Angeles, California: a thunder-storm, with hail and high wind, passed over this place on the 11th. Considerable damage was done to the track of the Southern Pacific Railroad between Los Angeles and San Fernando, causing a delay of trains. A number of cellars were flooded. The grain crop suffered severely, being beaten down by the hail. This storm is reported to have been equally as severe at San Diego.

Abilene, Texas: a heavy thunder-storm, accompanied by hail, passed over this place on the 12th, lasting from 8.45 to 10 p. m. The ground was covered with hail, measuring from one-fourth to an inch in diameter. The wind being light, but little damage resulted from the storm.

Nicolaus, Sutter county, California: on the 13th, at 7.45 p. m., a heavy thunder-storm occurred, which is an unusual phenomenon for this place. The track of storm was about twelve miles wide. Five miles below here the precipitation was in the form of hail, which did not all melt until noon next day. Farmers report many wild geese picked up on the plains, killed either by hail or lightning.

Sauk Rapids, Saint Cloud, and Rice Station, Minnesota, and vicinity, were visited on the afternoon of the 14th, shortly after 4.00 p. m., by one of the most destructive tornadoes that has ever been reported in the Northwest. When first seen it was in the shape of a long and exceedingly black, funnel-shaped cloud, surrounded on all sides by perfectly clear sky, the tube of the funnel having a spiral shape and touching the ground. The general course of the tornado was from the southwest towards the northeast. When it had advanced until it was over the towns the air was so dark that it was impossible to see more than five feet.

The description below of the tornado as it appeared at Saint Cloud is given by an eye witness:

The tornado must have formed rapidly, and just about over the lake, as it was there when first noticed. It was very black, and seemed to be constantly in motion. It was moving rapidly across the lake when first seen, was flat and oval in shape, with a sort of spiral at each of the extremities, one extending upward and the other downward. It was peculiar in appearance, and I watched it closely. After having passed across the lake it seemed to stop. The movement resembled that of a fan opening and closing, and it remained stationary for some seconds. Almost instantly the form changed. Instead of lying flat, it seemed to turn on end and the spirals that ran up from the other end formed a part of a big double spiral. It had a movement that was peculiar, as if there was a commotion within it. The course was rapid and as soon as the big spiral was formed it began moving at a terrific rate in a course that was somewhat zigzag. It dropped down to the ground, and I saw the entire work of ruin. The course of the tornado after crossing the river was rather sinuous, though hardly as much so as before. It swept across the country, and in five minutes

from the time of reaching Sauk Rapids the work of destruction was done. There were two clouds at first that came together directly over the lake, and then turned on end and swept onward.

In the track of the tornado at Sauk Rapids, stood the Manitoba freight house and cars filled with freight. The tornado lifted the heavy cars from the tracks, and cast them in shapeless masses. The freight house was totally wrecked. Iron rails were torn from the track and twisted like wires; \$3,000 worth of freight was whirled through the air and thrown into heaps and scattered by piecemeal over an area of a quarter of a mile. Fifteen freight cars were demolished. Operators in the telegraph office and employes at the freight depot saw the tornado coming and fled to the cellars and thus escaped. Not a single business house was left standing in the main street, and many dwellings were demolished. The court house was left a heap of ruins, and several of the county officers killed. The Union School House, two churches, the post-office, a flour mill, and a large machine shop were completely destroyed in about forty seconds. The loss of property was estimated at \$250,000, the town being almost completely destroyed. A heavy iron truss-bridge across the Mississippi at Sauk Rapids was wrecked, and parts of it carried in the cloud a considerable distance before being dropped. Men, women, and children, as well as horses and cattle, were lifted into the air and dashed to the ground. The number of persons killed in the towns named above was at least fifty-five, and three times that number were injured. The bodies are described as presenting, in many cases, a blackened appearance, as if they had been scorched, while frequently the clothing was completely torn from them. Every description of this tornado speaks of it as being accompanied by a roaring and peculiar crackling sound, which became deafening as it approached, also that the black, oval-shaped cloud with a tube turning on the ground was seen by a number of persons, whose lives were saved by retreating to cellars and other underground apartments. The track of the tornado was about twenty miles long and twenty rods wide; immense damage was done to farm property, orchards, forests, and stock. During the passage of the tornado, and afterwards, rain fell in torrents.

On the afternoon and night of the same day, the 14th, on which the above tornado occurred, unusually destructive local storms and tornadoes occurred in widely separated parts of the country, as will be seen by the following:

Carson, Pottawottamie county, Iowa: on the 14th a tornado passed over Wheeler Grove, a village seven miles southeast of this place, completely demolishing the Mormon church and wrecking many other buildings.

Aurora, Wise county, Texas: this county was visited by a destructive tornado on the night of the 14th, which swept every thing before it, cutting a broad swath through the forests encountered in its course. A number of residences were demolished and twelve persons injured. Great damage was done to farm property, and considerable live stock killed. The tornado travelled from the southeast toward the northwest.

The following description of this storm is given by an observer:

About 9 o'clock a heavy rain set in, followed by an electrical display and hail storm. Suddenly, during a brief lull in the storm, the distant roar of an on-coming tornado was distinctly heard at this place. The inhabitants were panic-stricken. The night was pitch dark; the dull roar lasted a quarter of an hour, growing gradually less and less. Over a dozen farm houses were demolished. Occupants in nearly every residence sustained severe injury. So far as heard from, no lives were lost, but several injuries, it is believed, will prove fatal. The loss of property is very great, being estimated at over \$100,000 in Wise county alone. The path of the tornado proper was only two hundred yards in many places, but everything was leveled to the earth. For fifteen miles the track was covered with ruins of residences and barns. Many horses, cattle, and sheep in barns or field were killed.

Atchison, Kansas: a heavy rain and wind storm swept over the northern and northwestern parts of the state on the night of the 14th, prostrating telegraph poles and doing considerable damage to farm property. Within a few miles of Wetmore, on the Central Branch Railroad, a small tornado formed,

moving in a northeasterly direction and demolishing several farm houses.

Scott county, Missouri: a tornado occurred in the southeastern part of this county on the afternoon of the 14th, killing several persons and destroying much property. This is reported to have been a very severe tornado, but fortunately it passed through a thinly settled country.

Vicksburg, Mississippi: a severe thunder-storm, moving from southwest to northeast, passed over this place on the night of the 15th and 16th. The clouds floated very near the surface of the earth, affording a brilliant display of lightning. Several houses were struck and set on fire by the electric discharge.

Shreveport, Louisiana: at 2.30 on the 17th a very severe thunder-storm, accompanied by hail, began. The lightning was vivid and seemed to color the whole sky. West of the town the hail was very disastrous to market gardens, fruit trees, and cotton plants. Over a tract of country three miles long by one-half mile in width the damage was serious. The general course of the storm was from northwest to southeast. In some places the hail was seven inches deep, and from the size of a pea to three-fourths of an inch in diameter. The exterior of the stones presented the appearance of many minute ones massed together.

Salina, Saline county, Kansas: a hail and thunder-storm occurred on the 22d. The ground was completely covered with hail to a depth of two inches; owing to the strong wind it drifted in places five inches deep.

Fort Worth, Tarrant county, Texas: on the 25th a destructive wind storm, accompanied by rain and hail, swept over this place. The storm began at 7 p. m., continuing for about an hour. Stores were unroofed and stables and shops were blown down in several parts of the city. The damage was estimated at \$20,000.

Akron, Hale county, Alabama: a very disastrous tornado occurred in this vicinity on the 25th. The telegraph wires were thrown down, many houses demolished, trees were uprooted, and the entire section was devastated.

Fort Smith, Arkansas: a destructive hail and wind storm visited this place on the 25th. Four small houses were demolished, and forty buildings were damaged, principally by hail. The lowest estimate of the value of property destroyed is \$25,000. This storm lasted from 8.30 to 10 p. m., the precipitation during that time being 2.32 inches. The hail was larger in size and quantity, and more severe in its effects, than any known to have fallen here since the establishment of the Signal Service station; it covered the ground to a depth of about two inches and measured from one-quarter to one-half inch in diameter. The storm was accompanied by continuous sheet lightning and low, rumbling thunder.

Pensacola, Florida: during the 28th a gale and thunder-storm occurred. The wind reached a maximum velocity of thirty-three miles at 9.45 a. m. Considerable damage was done to shipping; thousands of dollars worth of lumber was blown into the bay.

Mississippi City, Harrison county, Mississippi: great damage was done north of this town, by a storm having the characteristics of a tornado, on the 28th. A substantial dwelling recently built, with out-houses, was completely demolished. The storm moved in a path half a mile wide, destroying large quantities of timber.

The following is a summary of the tornadoes of April, 1886, as reported by special tornado observers:

Near Atlantic, Cass county, Iowa: 14th, 4.30 p. m.; direction of path southwest to northeast.

Near Brockway, Stearns county, Minnesota: 14th, 4 p. m.

Phillips, Hamilton county, Nebraska: 14th, 6.15 p. m.; storm lasted from three to five minutes.

Bartlett, Ramsey county, Dakota: 16th; passed north of town during the afternoon.

Near Bedford, Taylor county, Iowa: 14th, 8.30 p. m.; course of storm a little east of north; cloud funnel-shaped; rotary motion against the hands of a watch, face upwards; six people injured; width of path one hundred and fifty feet.

Near Wetmore, Nemaha county, Kansas: 14th; during the night; course southwest to northeast.

Three miles southwest of Fonda, Pocahontas county, Iowa: 14th, 3.30 p. m.; course northeast; cloud funnel-shaped.

Sidney, Fremont county, Iowa: 14th, 4 p. m.; course southwest to northeast.

Shubert, Richardson county, Nebraska: 14th, p. m.

Island Ford, Rutherford county, North Carolina: 15th; evening; course southwest to northeast.

Near Alexandria, Douglas county, Minnesota: 14th, p. m.

Near Griswold, Cass county, Iowa: 14th, 4 p. m.; course north-northeast; much stock killed; fourteen dwellings, eighteen barns, and three school-houses destroyed.

Coon Rapids, Carroll county, Iowa: 14th, 5.05 p. m.; course north-northeast; cloud funnel-shaped, whirling against the hands of a watch; thirty-two buildings destroyed.

Story City, Story county, Iowa: 14th, 5.10 p. m.; course north 30° east; cloud funnel-shaped, whirling contrary to the movement of the hands of a watch; weather very warm and oppressive before the storm.

Saint Cloud, Stearns county, and Sauk Rapids, Benton county, Minnesota: 14th, 4.27 p. m.; course of storm north-northeast; cloud funnel-shaped; very heavy rain fell before and after the passage of the tornado cloud; air preceding storm sultry and oppressive; rotation of cloud from right to left; two hundred and fifty buildings destroyed; seventy-four persons killed, and one hundred and thirty-six wounded; loss of property about \$400,000.

Two miles south of Rome, Wise county, Texas: 14th, 10.30 p. m.; course of storm north-northeast; temperature 92° at noon; weather very oppressive; hail and rain fell before the tornado cloud approached.

Six miles southwest of Skidmore (Burr Oak Grove), Nodaway county, Missouri: 14th, 7.30 p. m.; course southwest to northeast; six persons killed, and ten wounded; much stock killed, and many buildings destroyed.

Lenox, Taylor county, Iowa: 14th, about 6.30 p. m.; several persons killed.

Jamestown, Dakota: 14th, during the afternoon.

NAVIGATION.

In the following table are shown the danger-points at the various river stations; the highest and lowest depths for April, 1886, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, April, 1886.

[Expressed in feet and tenths.]

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River:</i>						
Shreveport, Louisiana.....	39.9	29	18.3	4, 5, 9, 10	15.3	3.0
<i>Arkansas River:</i>						
Fort Smith, Arkansas.....	39.0	19	12.9	25	6.1	6.8
Little Rock, Arkansas.....	23.0	31	14.1	11	7.7	6.4
<i>Missouri River:</i>						
Yankton, Dakota.....	24.0	14	16.5	2, 3	9.5	7.0
Omaha, Nebraska.....	18.0	15	9.3	21, 22, 26	7.7	1.6
Leavenworth, Kansas.....	30.0	17	14.1	28	9.8	4.3
<i>Mississippi River:</i>						
Saint Paul, Minnesota.....	14.5	1	8.3	11	4.4	3.8
La Crosse, Wisconsin.....	24.0	23, 24	11.8	7, 8	7.0	4.8
Dubuque, Iowa.....	16.0					
Davenport, Iowa.....	15.0	30	12.3	4 to 8	8.3	4.0
Keokuk, Iowa.....	14.0	1	14.3	15	10.6	3.7
Saint Louis, Missouri.....	32.0	21	23.7	15, 16	20.8	2.9
Cairo, Illinois.....	40.0	18, 19	31.0	30	32.0	19.0
Memphis, Tennessee.....	34.0	26, 27, 28, 29	35.7	1	27.0	8.7
Vicksburg, Mississippi.....	41.0	30	43.7	1	27.4	16.3
New Orleans, Louisiana.....	13.0	28	14.3	1	9.4	4.9
<i>Ohio River:</i>						
Pittsburg, Pennsylvania.....	22.0	7	22.6	30	3.2	19.4
Cincinnati, Ohio.....	36.0	9	55.8	30	13.0	42.8
Louisville, Kentucky.....	25.0	10	32.9	30	6.8	26.1
<i>Cumberland River:</i>						
Nashville, Tennessee.....	40.0	10	49.3	29, 30	6.2	43.1
<i>Tennessee River:</i>						
Chattanooga, Tennessee.....	33.0	3	52.1	30	6.0	46.1
<i>Monongahela River:</i>						
Pittsburg, Pennsylvania.....	29.0	7	22.6	30	3.2	19.4
<i>Sacramento River:</i>						
Angusta, Georgia.....	32.0	1	32.2	27, 28	8.7	23.5
<i>Mobile River:</i>						
Mobile, Alabama.....		14	19.4	2	16.7	2.7
<i>Sacramento River:</i>						
Red Bluff, California.....		17	20.5	1	3.3	17.0
Sacramento, California.....		23	23.8	1	17.5	6.3
<i>Willamette River:</i>						
Portland, Oregon.....		19	9.9	1	4.4	5.5
<i>Colorado River:</i>						
Yuma, Arizona.....		28	20.0	3	16.5	3.5

STAGE OF WATER IN RIVERS.

The Mississippi River reached its highest stage during the month at all stations north of Keokuk, Iowa, on the 1st, while at Memphis, Tennessee, and stations south of that place, the river did not pass the danger-point until after the 25th.

The Ohio, on account of the floods of the latter part of March,

continued very high during the first decade of April; its volume of water, being increased by the heavy snow and rain of the 5th and 6th, reached its highest point at Cincinnati, Ohio, on the 9th.

ICE IN RIVERS AND HARBORS.

Connecticut River.—North Stratford, New Hampshire: owing to the ice gorge which formed on the 2d, the river overflowed, flooding the Grand Trunk Railway tracks and causing a suspension of traffic.

Israel River.—Lancaster, New Hampshire: on the 1st the ice in Israel River formed a jam below Mechanic street bridge and caused the river to be partially turned from its course; a part of the current was turned down the streets carrying with it huge blocks of ice, and flooding houses.

Lake Michigan.—Chicago, Illinois: navigation was resumed on the 8th. On the 21st vessels forced a passage through the ice in the Strait of Mackinac, and navigation between the upper and lower lakes was commenced, being a fortnight earlier than last year. A large number of steam and sailing vessels cleared from Chicago and Milwaukee for the lower lake ports.

Mackinaw City, Michigan: the strait on the 21st was partially free of ice. The first vessel passed through on that day, bound for Buffalo.

Lake Huron.—Alpena, Michigan: the fog and rainy weather caused the ice to break up during the 13th and 14th. A steamer from Detroit, the first vessel this spring, arrived at this port on the 15th.

Lake Superior.—Milwaukee, Wisconsin: the first vessel to pass through the strait from the lower lakes arrived on the 24th.

Marquette, Michigan: on the 29th the ice began to move out of the harbor, and navigation was resumed.

Lake Erie.—Buffalo, New York: navigation opened on the 15th, the first vessel arriving on that day.

Lake Ontario.—Oswego, New York: navigation was resumed at this port on the 1st, the schooner "Speedwell" arriving from Toronto.

Lake Quinsigamond.—Worcester, Massachusetts: the ice disappeared from the lake on the 2d, which was two weeks earlier than last year.

Missouri River.—Bismarck, Dakota: ice broke up and began moving out of the river on the 8th.

Fort Buford, Dakota: river opened about noon on the 6th.

Escanaba River.—Escanaba, Michigan: the high water in the river broke the ice on the 24th. The ice in the bay continued firm.

Red River of the North.—Fort Pembina, Dakota: the ice in the river began moving out on the 12th. On the 15th the river was clear of ice.

Grand Traverse Bay.—Traverse City, Michigan: ice began moving out of the bay on the 22d; by the 25th the bay was open for navigation.

Devil's Lake.—Fort Totten, Dakota: ice broke up on the 22d.

Mississippi River.—Saint Paul, Minnesota: the first steamer of the season arrived at this port on the 17th.

Saint Clair River.—Port Huron, Michigan: the river was filled with floating ice during the entire month; several vessels which left port during the first half of the month were compelled to return on account of ice. An immense ice gorge, twenty-five feet high, formed at the foot of Lake Huron on the 7th and did not break for several days.

FLOODS.

Very heavy rainfalls occurred in the Southern States and Ohio Valley from the 26th of March to the 2d of April; the rains were excessively heavy in eastern Tennessee and northern Alabama, and caused unusually destructive floods concerning which the following reports, arranged by states, are given:

Alabama.—Montgomery: the flood of the latter part of March and first of April is considered the most disastrous that has ever occurred in this vicinity. The Alabama River, its tributaries, and all of the numerous rivers and creeks of this state

overflowed. On the 1st the city was completely surrounded by water, and all the low-lying part flooded. Much property was destroyed. The water began to subside on the 2d. Thousands of cattle, horses, mules, and hogs were swept away and corn, cotton seed, and provisions were destroyed. Nearly all the factories in the city stopped work on account of the flood. The only illumination in the city was by candles and oil. Viewed from the dome of the Capitol, the highest point in the city, was a lake of water to the north and west, fully seven miles square.

Birmingham, Jefferson county: the greatest disaster by flood in this state was along the Alabama and Coosa rivers, in Coosa, Elmore, Montgomery, Autauga, and Dallas counties. At Wetumpka, the county seat of Elmore county, the water was four feet deep in the business houses of the town, and the occupants were driven out of many of their residences. Many bridges and mills were destroyed in Elmore county, and large areas of the best farming country were under water.

Georgia.—Augusta: the flood of the latter part of last month still continued during the 1st and 2d. The river attained its maximum height at noon of the 1st. Hamburg, South Carolina, on the opposite side of the river, was entirely surrounded by water; railroad travel over the bridge crossing the Savannah was suspended; all the lower portion of the city was under water. The railroad companies have sustained heavy losses, while the damage suffered by the factories and other property in Augusta will not fall short of \$20,000. The water subsided rapidly during the 2d.

Rome, Floyd county: the gas-works were submerged on the 2d. The loss by flood at this place it is estimated will reach \$500,000. The entire town, except on the hills, was under water from one to eleven feet, and fifteen dwellings were washed away. The water came so rapidly that it was impossible to save furniture, etc.

Columbus: the Chattahoochee began falling on the 1st, leaving much mud in the city. Columbus is said to have been damaged \$50,000 by the flood. Plantations below this town were reported covered with water from five to eight feet deep.

Tennessee.—Chattanooga: the river rose steadily on the 1st. The city was surrounded by water, the fifth ward being almost submerged; the water-works shut down owing to the flood extinguishing the fires. Both gas-works suspended operations and business of all kinds was suspended. Several persons were drowned and many on the outskirts of the city had their homes washed away. On the 2d the water was fifty-three feet above low-water mark, and did not begin to subside until the afternoon of the 3d. At other places along the Tennessee the damage is reported very serious; more than fifty houses are known to have floated past Whitesburg, Alabama.

Nashville: the Cumberland reached its highest stage on the 10th. The river-gauge marked forty-nine feet, being five feet below the high-water mark of 1882. The damage sustained by mill-owners and lumbermen is not so great as was to have been expected, owing to the timely and continued warnings of the Signal Service. The city mills lost very little, except in time and the cost of making goods secure. Great loss was suffered by farmers; the destruction of the wheat crop in the Cumberland lowlands will possibly amount to half a million dollars, necessitating a second plowing of the ground and the planting of corn or some other grain.

Illinois.—Cairo: the Ohio River was very high from the 1st to the 27th, inclusive, causing great suffering and loss of property. In this city the Illinois Central Railroad was damaged by the track, near the river, being undermined and torn away. Traffic was suspended on this road for several days. Many families, between this city and Paducah, Kentucky, were compelled to move their goods to the second story for safety. The back-water from the Ohio inundated the land on the Missouri side for a distance of five miles, causing great loss to the farmers, their stock being drowned, growing crops buried in mud, and fences carried away. Between this city and Memphis the country resembled a lake, the water spreading for miles through the bottoms, with all landings submerged, and at some points

only roofs of houses being visible. At Metropolis, Illinois, thirty miles north of here, many houses were submerged, being accessible only by water; the lowlands were flooded from ten to twenty feet.

Kentucky.—Louisville: during the first week of this month the Ohio River at all points was above the flood-line, caused by melting snow and continuous heavy rains. In the lowlands many houses were abandoned. Wharf boats were moored to brick houses that stand two hundred feet back from the wharf, and craft floated within a stones' throw of Main street.

London, Laurel county: all tributaries of the Cumberland and Kentucky rivers were very high on the 1st; much lumber was lost and damage done to other property.

Arkansas.—Helena, Phillips county: on the 22d, about fifteen miles below this place, the levee crumbled from the immense pressure of water against it, and a large crevasse was soon washed out, emptying an immense volume of water into one of the finest agricultural sections in the Mississippi Valley, affecting immediately plantations containing about 8,000 acres in cultivation, many of them planted with this year's crops of corn and cotton.

Virginia.—Richmond, 6th: the steady rains of the past three days have caused the waters of Virginia streams to rise, submerging all the wharves in the lower part of the city. The water was highest on the 1st, nearly all that portion of the city known as the "Rocketts" being covered to a depth of five or six feet, cutting off communication between the upper and lower portions of the city.

West Virginia.—Charleston: the flood in the Kanawha and Elk rivers, which resulted in submerging half the city, began receding on the morning of the 2d. Hundreds of people living in small houses were great sufferers, having lost their entire possessions.

Maryland.—Cumberland: it is reported that the heavy rains of the latter part of March and the first part of this month caused the South Branch of the Potomac to rise to a greater height than has been known for nine years. Trains were not able to get through on the 1st, the Baltimore and Ohio Railroad being submerged at that point.

Havre de Grace, Harford county: four bents of trestle-work on the new bridge of the Baltimore and Ohio Railroad over the Susquehanna were washed away on the 2d. The river was very high.

Ohio.—Cincinnati: the Ohio River was very high from the 1st to 4th, flooding cellars and otherwise injuring property.

The following is from the "New York Herald" of April 3d:

CINCINNATI, OHIO, April 2, 1886.—At half past eight o'clock this evening the snow, which had been falling nearly all day, measured nearly four inches in depth and was still falling. This fact, together with the reported rains up the river, caused considerable apprehension as to a flood, and business houses in the bottoms have been busy all day removing their goods. Many cellars are already flooded, and the mills of the Licking River have closed. The river at eight o'clock was fifty feet nine inches and rising two inches an hour.

Pennsylvania.—Mount Carmel, Northumberland county: rain fell incessantly on the 5th and 6th, flooding the collieries and causing suspension of work. The lowland lying along the Shamokin Creek was submerged and the residents compelled to move to the upper stories of their houses.

Huntingdon, Huntingdon county: the continuous rain and melting snow from the mountains on the 5th and 6th caused the Juniata River to rise to an unusual height. On the 7th many out-buildings and trees were swept past this place. One lumber firm lost two million feet of logs.

Vermont.—Montpelier: the heavy rain of the 31st of March and the melting of the mountain snow raised the Winooski River, breaking the ice and flooding the banks. The main street of the town of Berlin was filled with ice. A heavy railroad bridge was carried away.

New Mexico.—Santa Fé: heavy rain and high southeasterly wind began on the 19th, continuing all day of the 20th, causing the Santa Fé Creek to assume the proportions of a rapid river. Telegraph communication was interrupted, railroad bridges were washed away and several miles of track destroyed.

Canada.—Montreal: this city was visited by a flood during the 18th, 19th, and 20th. Business was at a complete standstill. Hundreds of wholesale and retail houses were closed, being inaccessible except by boats. The suffering of the residents in the flooded part of the city was intense. In Griffintown thousands of persons were forced to the upper part of their houses by the water. Twenty-four streets were reported covered with water to the depth of five feet. The flood showed signs of abatement on the 20th.

HIGH TIDES.

Eastport, Maine, 6th.
Block Island, Rhode Island, 6th, 20th.
New Haven, Connecticut, 6th.
Sandy Hook, New Jersey, 6th.
Atlantic City, New Jersey, 6th.

LOW TIDES.

Indianola, Texas, 1st, 5th to 11th, 16th, 17th, 19th to 23d, 30th.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for districts east of the Rocky Mountains during April, 1886, with the telegraphic reports for the succeeding thirty-two hours, shows the general average percentage of verifications to be 80.19 per cent. The percentages for the four elements are: Weather, 83.02; direction of the wind, 82.39; temperature, 75.31; barometer, 76.39 per cent. By geographical districts, they are: For New England, 68.57; middle Atlantic states, 79.53; south Atlantic states, 85.58; eastern Gulf states, 87.68; western Gulf states, 84.28; lower lake region, 75.00; upper lake region, 79.49; Ohio Valley and Tennessee, 82.29; upper Mississippi valley, 80.79; Missouri Valley, 78.87. There were eight omissions to predict, out of 2,736, or 0.29 per cent. Of the 2,728 predictions that have been made, eighty-five, or 3.12 per cent., are considered to have entirely failed; one hundred and seventy-seven, or 6.49 per cent., were one-fourth verified; four hundred and twenty-five, or 15.57 per cent., were one-half verified; four hundred and forty-one, or 16.17 per cent., were three-fourths verified; 1,600, or 58.65 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

The percentages of verifications of special predictions for certain localities are, as follows:

Omaha, Nebraska (twenty-six days), 79.81; Arkansas (twenty-six days), 86.54; Baltimore, Maryland (twenty-six days), 71.64; Washington City, 75.41; Portland, Maine, 70.83; Boston, Massachusetts, 68.75; New Haven, Connecticut, 71.67; Albany, New York, 72.50; Pittsburg, Pennsylvania, 74.17; Cincinnati, Ohio, 74.17; Louisville, Kentucky, 70.00; Indianapolis, Indiana, 65.83; Columbus, Ohio, 62.07; Oswego, New York, 69.58; Rochester, New York, 72.50; Buffalo, New York, 69.17; Erie, Pennsylvania, 69.17; Cleveland, Ohio, 65.00; Davenport, Iowa, 72.91; Toledo, Ohio, 74.58; Sandusky, Ohio, 61.67; Milwaukee, Wisconsin, 73.73; Chicago, Illinois, 76.25; Lynchburg, Virginia, 79.17; Georgia, 84.58; northern Florida, 89.17; Shreveport, Louisiana, 67.50; Tennessee, 74.58; Memphis, Tennessee, 80.00; Saint Louis, Missouri, 74.17; Cairo, Illinois, 81.67; western Missouri, 79.17; Iowa, 81.67; Saint Paul, Minnesota, 85.00; Nebraska (seventeen days), 77.94; Palestine, Texas (twelve days), 75.00.

CAUTIONARY SIGNALS.

During April, 1886, one hundred and thirty-six cautionary signals were ordered. Of these, seventy-six, or 55.88 per cent., were justified by winds of twenty-five miles or more per hour at or within one hundred miles of the station. Sixteen cautionary off-shore signals were ordered, of which number, eight, or 50.00 per cent., were fully justified, both as to direction and velocity; sixteen, or 100 per cent., were justified as to direction; and eight, or 50.00 per cent., were justified as to velocity. One hundred and fifty-two signals of all kinds

were ordered, eighty-four, or 55.26 per cent., being fully justified. These do not include signals ordered at display stations where the velocity of the wind is only estimated. Of the above cautionary off-shore signals, twelve were changed from cautionary. Two signals were ordered late. In fifty-nine cases, winds of twenty-five miles or more per hour were reported for which no signals were ordered.

COLD-WAVE SIGNALS.

No cold-wave signals were ordered during April.

RAILWAY WEATHER SIGNALS.

Prof. P. H. Mell, jr., director of the "Alabama Weather Service," in the report for April, 1886, states:

The verifications of predictions for the whole area was 93 per cent. for temperature, and 90 per cent. for weather.

The following corporations comprise this system: South and North; Montgomery and Mobile; Mobile and Girard; Georgia Pacific; East Tennessee, Virginia and Georgia system in Alabama; Memphis and Charleston; Columbus Western; Atlanta and West Point of Georgia; Northeastern of Georgia; Western and Atlantic; East Tennessee, Virginia and Georgia system in Georgia; Montgomery and Eufaula; Pensacola and Selma; Pensacola and Atlantic; and the cities of Milledgeville, Georgia, and Talladega, Alabama.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroral displays were not very numerous during April, 1886. The most brilliant and extensively observed display was that of the 20th; it was generally observed in the northern districts from Montana eastward to Maine.

The following notes refer to the displays reported during the month:

Prairie du Chien, Crawford county, Wisconsin: a white auroral arch above a dark segment was observed during the evening of the 1st.

Fort Yates, Dakota: an aurora was observed from 9.38 to 10.50 p. m. of the 1st. The auroral light consisted of a horizontal bar of white light extending from northwest to southeast. An aurora was also observed on the 20th, from 10.30 to 11.20 p. m.

Bismarck, Dakota: an aurora was observed from 9.45 to 11.20 p. m. on the 1st, having two separate pillars of light 5° wide and 30° altitude. The light was a pale yellow color, the maximum brilliancy occurring at 10.15 p. m.

Escanaba, Michigan: faint aurora observed at 10 p. m. on the 4th, and continued until after midnight. On the 12th a faint orange-colored arch 20° above the horizon was observed about 9 p. m.

Saint Vincent, Minnesota: an aurora was observed at 9.35 p. m. of the 12th, consisting of a pale whitish light shooting up to a height of 20°.

Gardiner, Kennebec county, Maine: on the 14th a brilliant aurora was observed at 10.45 p. m., with beams flashing up towards the zenith. At 2.30 a. m. the aurora was still visible but fainter on account of the moon which was then shining brightly.

Cambridge, Massachusetts: a faint auroral arch was observed from 8.30 to 9.45 p. m. of the 14th, which increased in brightness until about 11 p. m., when it began to fade away. An aurora was also seen at 10 p. m. of the 30th. This aurora was low and irregular with some appearance of streamers, with dark sky below; later a faint arch appeared. The display ended at 11 p. m.

Mackinaw City, Michigan: an aurora of 15° altitude and 30° azimuth was seen on the 20th during the evening. It was so faint that it could not be seen after the moonlight began.

Poplar River, Montana: a pale yellow aurora was seen at 10.30 p. m. of the 20th. Numerous beams, not well defined, rose to the altitude of 30°. The beams were interspersed with dark rays resembling dense smoke. The display ended at 11.30 p. m.

Fort Assinaboine, Montana: a bright auroral display was first seen at 10 p. m. of the 20th, consisting of an arch of pale white color above a dark segment. The arch was about 90° azimuth and 17° to 20° altitude. At midnight it had almost

Table of miscellaneous meteorological data for April, 1886—Signal Service observations.

Stations.	Elevation above level.	Atmospheric pressure (in inches and hundredths).						Temperature of the air (in degrees Fahrenheit).												Winds.													
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.		Monthly range of barometer.	Monthly mean.	Departure from normal.	Extremes.		Monthly range.	Daily ranges.		Mean rel. humidity.	Mean dew-point.	Precipitation.	Departure from normal.	Total movement.	Prevailing direction.	Maximum velocity.		Miles p. h.	Direction.	Date.	No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.				
					Highest barometer.	Lowest barometer.				Max.	Min.		Greatest.	Least.																			
					Date.	Date.				Date.	Date.		Date.	Date.																			
New England.																																	
Eastport	61	30.04	+ .24	30.11	30.61	16	29.59	23	1.02	40.1	2.1	71.3	19	48.2	24.2	4	33.4	47.1	30.7	19	4.0	175.6	32.0	1.14	+ .266	5.246	s.	58	no.	7	5	9	16
Portland	99	30.01	+ .23	30.12	30.61	16	29.63	23	0.98	44.7	1.1	73.8	19	53.0	29.4	4	37.1	50.4	31.6	18	3.7	671.3	34.9	2.28	+ .070	5.382	s.	36	no.	6	5	7	12
Mount Washington	6,279	23.78	.....	30.20	30.65	17	29.67	6	0.98	28.5	7.7	52.2	23	35.4	23.4	4	22.5	49.9	23.8	12	4.0	1388.1	25.1	3.36	+ .230	18.645	nw.	110	sw.	1	11	15	10
Boston	125	29.99	+ .20	30.12	30.62	11	29.57	6	1.05	47.7	3.7	84.3	23	56.7	26.9	4	40.6	57.4	34.9	23	4.9	688.6	36.6	1.70	+ .231	7.664	e.	51	e.	6	9	8	14
Block Island	27	30.10	.....	30.12	30.63	16	29.50	6	1.13	45.2	2.0	69.7	24	52.1	31.9	4	40.6	37.8	25.0	19	4.1	588.8	42.0	3.26	+ .014	8.595	ne.	40	ne.	6	11	8	12
Narragansett Pier	107	30.01	.....	30.12	30.61	16	29.49	6	1.12	48.4	2.7	81.0	24	57.0	30.4	4	39.7	51.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
New Haven	47	30.09	+ .18	30.13	30.63	11	29.54	6	1.09	48.1	2.9	77.4	24	56.7	31.5	9	41.3	45.9	30.0	24	6.7	475.6	40.1	3.63	+ .024	4.768	se.	30	sw.	1	11	4	20
New London	47	30.09	+ .18	30.13	30.63	11	29.54	6	1.09	48.1	2.9	77.4	24	56.7	31.5	9	41.3	45.9	30.0	24	6.7	475.6	40.1	3.63	+ .024	4.768	se.	30	sw.	1	11	4	20
Mid. Atlantic States.																																	
Albany	83	30.05	+ .18	30.13	30.56	11	29.55	6	1.01	50.4	5.2	83.5	23	61.4	25.7	4	41.3	57.8	32.8	18	4.6	868.4	39.4	3.67	+ .108	3.576	s.	39	s.	1	13	12	14
New York City	168	29.94	+ .15	30.11	30.57	17	29.44	6	1.13	50.3	3.2	84.0	22	60.2	29.4	4	42.6	54.6	33.4	19	5.9	572.8	40.6	4.95	+ .179	6.220	ne.	40	ne.	6	9	6	15
Philadelphia	117	29.99	+ .13	30.11	30.50	17	29.37	6	1.18	53.4	3.6	84.4	24	64.3	29.3	4	44.8	55.1	33.2	19	5.3	574.0	44.1	2.70	+ .030	6.545	ne.	43	sw.	1	7	11	14
Atlantic City	13	30.08	+ .13	30.08	30.50	17	29.38	6	1.13	48.0	1.6	83.4	24	54.8	28.4	9	41.0	55.0	29.5	24	4.3	582.3	42.2	1.86	+ .163	7.038	e.	32	ne.	5	6	5	13
Sandy Hook	28	30.08	+ .14	30.10	30.55	17	29.42	6	1.13	48.7	2.5	80.0	22	57.7	31.0	4	42.8	49.0	33.0	19	3.0	579.8	42.0	5.06	+ .068	10.769	e.	60	e.	6	15	6	14
Cape Henlopen	45	30.05	+ .09	30.08	30.52	17	29.38	6	1.14	54.6	1.6	87.8	24	64.4	33.8	4	46.9	54.0	28.9	9	3.8	569.1	43.2	2.06	+ .101	4.085	ne.	28	sw.	1	7	8	13
Baltimore	106	29.99	+ .09	30.09	30.51	17	29.40	6	1.12	55.5	2.9	88.1	24	65.5	34.5	4	46.3	53.6	34.2	19	4.7	575.7	46.9	2.71	+ .019	4.281	e.	30	nw.	24	9	11	11
Washington City	16	30.07	+ .08	30.07	30.42	18	29.42	6	0.99	53.5	0.5	83.6	24	60.3	37.6	9	47.0	46.0	25.9	3	3.1	480.6	47.0	1.98	+ .318	9.705	ne.	40	ne.	30	8	6	10
Cape Henry	8	30.09	+ .10	30.08	30.47	17	29.36	6	1.11	51.9	2.3	82.6	23	59.3	37.2	4	44.8	45.4	26.7	25	4.0	480.8	45.6	2.59	+ .044	8.205	ne.	40	ne.	30	8	6	10
Chincoteague	652	29.39	+ .08	30.07	30.42	17	29.44	6	0.97	57.1	2.3	88.6	24	68.7	31.0	9	46.0	57.6	37.1	19	3.8	572.5	46.8	4.82	+ .142	2.884	ne.	15	nw.	27	12	10	12
Norfolk	30	30.06	+ .10	30.08	30.41	12	29.43	6	0.99	56.1	0.2	87.0	24	66.3	38.1	9	48.3	48.9	29.3	20	5.4	287.4	46.8	3.16	+ .081	4.456	ne.	24	sw.	6	8	8	13
South Atlantic States.																																	
Charlotte	808	29.22	+ .06	30.05	30.35	9	29.58	5	0.77	59.7	0.6	86.6	24	70.6	32.5	8	48.7	54.1	32.7	23	6.3	297.5	51.1	3.88	+ .067	4.441	sw.	22	w.	6	12	8	16
Fort Macon	11	30.07	+ .08	30.05	30.36	12	29.51	5	0.86	60.6	3.2	71.8	23	66.7	39.7	8	55.8	54.1	32.7	23	6.3	297.5	51.1	3.88	+ .067	4.441	sw.	22	w.	6	12	8	16
Hatteras	12	30.07	+ .07	30.06	30.42	12	29.51	5	0.90	58.9	3.0	76.5	27	65.9	38.6	10	53.1	37.7	23	3.3	4.2	298.0	52.4	2.97	+ .057	7.796	sw.	48	ne.	29	10	8	11
Kitty Hawk	9	30.09	+ .07	30.08	30.43	12	29.48	6	0.95	54.2	0.1	84.3	24	60.9	39.3	9	48.6	45.0	29.9	3	3.9	308.8	47.6	5.00	+ .059	10.172	ne.	42	ne.	29	8	6	11
New River Inlet	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Smithville	34	30.03	+ .03	30.04	30.36	9	29.50	29	0.86	61.3	0.7	78.2	27	69.4	39.0	8	53.2	39.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wash Woods	52	30.02	+ .05	30.05	30.37	9	29.54	29	0.83	62.1	0.5	86.7	27	72.2	40.4	9	53.9	37.5	31.5	23	6.1	584.0	55.8	3.10	+ .022	8.449	sw.	33	s.	5	9	5	12
Wilmington	52	30.02	+ .05	30.05	30.37	9	29.54	29	0.83	62.1	0.5	86.7	27	72.2	40.4	9	53.9	37.5	31.5	23	6.1	584.0	55.8	3.10	+ .022	8.449	sw.	33	s.	5	9	5	12
Charleston	52	30.03	+ .05	30.05	30.37	9	29.58	29	0.79	62.4	2.0	81.4	24	70.7	39.4	8	53.1	47.3	30.2	23	9.3	571.6	51.7	3.26	+ .008	5.520	sw.	25	e.	18	8	5	13
Augusta	183	29.90	+ .02	30.04	30.34	9	29.61	5	0.73	63.7	1.7	88.6	24	75.5	33.0	8	55.5	40.2	21.9	1	8.6	287.4	53.7	1.19	+ .348	6.082	e.	32	ne.	18	7	2	13
Savannah	87	29.99	+ .03	30.05	30.36	9	29.65	29	0.71	63.7	1.7	88.6	24	75.5	33.0	8	55.5	40.2	21.9	1	8.6	287.4	53.7	1.19	+ .348	6.082	e.	32	ne.	18	7	2	13
Jacksonville	43	30.02	+ .02	30.03	30.30	9	29.67	29	0.63	66.5	2.4	85.6	27	74.8	44.0	8	57.4	44.3	21.2	23	10.0	187.9	55.7	2.06	+ .248	6.968	e.	37	ne.	18	8	5	12
Florida Peninsula.																																	
Cedar Key	22	30.00	+ .04	29.98	30.23	9	29.68	29	0.54	65.8	4.6	81.2	25	73.8	44.4	6	59.2	41.6	22.1	23	6.3	197.4	57.2	3.08	+ .022	5.526	ne.	30	s.	28	9	6	10
Key West	22	30.00	+ .04	29.98	30.23	9	29.68	29	0.54	65.8	4.6	81.2	25	73.8	44.4	6	59.2	41.6	22.1	23	6.3	197.4	57.2	3.08	+ .022	5.526	ne.	30	s.	28	9	6	10
Sanford	25	30.03	.....	30.02	30.27	9	29.68	29	0.59	66.1	4.7	86.0	27	74.9	44.2	7	59.0	41.8	26.1	2	5.5	187.3	66.1	1.99	+ .065	6.683	ne.	34	n.	19	8	1	12
Eastern Gulf States.																																	
Atlanta	1,129	28.89	+ .03	30.05	30.32	9	29.64	28	0.68	60.4	0.4	82.0	23	70.0	31.8	8	51.8	50.7	32.5	8	6.0	764.6	47.0	2.52	+ .266	7.862	se.	33	nw.	30	13	6	13
Pensacola	30	30.02	+ .00	30.01	30.32	9	29.62	28	0.62	63.9	2.5	82.0	23	72.5	38.6	6	58.8	43.4	24.6	7	3.8	474.4	56.3	6.83	+ .175	5.909	se.	33	s.	28	10	2	13
Mobile	35	30.02	+ .02	30.02	30.24	9	29.62	28	0.63	63.9	3.1	84.0	22	72.0	37.0	6	56.2	47.0	26.0	7	6.2	78.4	55.9	5.86	+ .011	6.067	se.	30	se.	28	10	2	13
Montgomery	219	29.82	+ .01	30.02	30.27	9	29.61	28	0.65	64.8	1.2	84.3	24	74.7	36.5	6	54.9	47.8	27.9	21	7.4	66.8	50.8	7.38	+ .111	4.710	e.	24	nw.	5	9	8	7
Vicksburg	209	29.81	+ .01	30.00	30.23	6	29.66	28	0.57	64.2	1.3	88.0	22																				

Table of miscellaneous meteorological data for April, 1886—Signal Service observations—Continued.

Stations.	Atmospheric pressure (in inches and hundredths).										Temperature of the air (in degrees Fahrenheit).										Winds.														
	Elevation above level.	Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.				Monthly range of barometer.	Monthly mean.	Departure from normal.	Extremes.				Monthly range.	Daily ranges.			Mean rel. humidity.	Mean dew-point.	Precipitation.	Departure from normal.	Total movement.	Prevailing direction.	Maximum velocity.									
					Highest barometer.	Date.	Lowest barometer.	Date.				Max.	Date.	Mean max.	Min.		Date.	Mean min.	Greatest.							Date.	Least.	Date.	Miles p. h.	Direction.	Date.	No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
Upper Miss. Valley.																																			
Saint Paul.....	831	29.07	+0.03	29.04	30.39	19	29.35	26 1.03	49.2	+4.6	81.3	21	59.4	13.5	2	39.9	67.8	30.2	23	7.5	29	74.0	40.4	3.67	+1.58	5,130	se.	28	se.	14	10	13	11	6	
La Crosse.....	725	29.20	+0.03	29.17	30.40	19	29.33	26 1.02	52.0	+5.4	81.0	21	61.4	18.6	2	43.9	62.4	25.6	8	8.9	11	70.4	42.2	1.60	+0.34	5,853	se.	25	nw.	14	13	12	7	11	
Davenport.....	645	29.34	+0.03	29.31	30.38	19	29.34	26 0.84	52.0	+2.9	81.5	21	61.8	13.9	2	43.4	67.6	27.0	8	4.4	11	69.1	41.1	1.84	+1.19	6,652	se.	24	se.	14	8	8	18	4	
Des Moines.....	565	29.08	+0.03	29.05	30.37	19	29.46	26 0.91	52.7	+3.5	83.5	21	63.3	20.7	2	44.5	62.8	32.1	7	6.6	24	72.9	43.6	4.32	+1.54	3,566	se.	34	sw.	14	14	18	8	4	
Dubuque.....	618	29.32	+0.03	29.29	30.35	19	29.53	26 0.82	53.6	+2.4	81.9	22	63.8	23.7	5	45.1	58.2	28.0	8	7.0	3	72.5	44.0	1.52	+1.60	7,191	se.	37	se.	16	12	7	15	8	
Keokuk.....	359	29.64	+0.03	29.61	30.30	19	29.65	26 0.65	57.0	+0.4	80.5	23	65.3	29.0	5	50.9	51.5	23.4	1	2.6	3	65.8	44.8	6.64	+2.53	6,232	se.	29	nw.	5	12	12	13	5	
Cairo.....	644	29.33	+0.04	29.30	30.33	19	29.60	26 0.74	56.1	+3.3	81.0	23	64.0	24.5	5	47.1	56.5	28.9	8	6.0	16	68.4	45.4	2.98	+1.91	7,411	se.	28	n.	6	8	9	14	7	
Springfield.....	571	29.40	+0.03	29.37	30.34	19	29.63	26 0.70	59.1	+4.0	84.0	23	67.2	24.1	4	51.6	59.9	26.0	13	5.4	3	70.4	48.8	2.10	+1.40	8,323	se.	33	nw.	1	12	11	12	7	
Saint Louis.....																																			
Missouri Valley.																																			
Lamar.....	1,028	28.92	.....	30.00	30.36	5	29.62	28 0.74	54.8	.....	84.0	21	66.1	24.0	5	45.9	60.0	29.3	27	3.8	3	74.0	45.7	1.78	.....	8,260	se.	32	nw.	29	10	10	9	11
Leavenworth.....	842	29.11	+0.04	29.00	30.40	19	29.35	25 0.83	54.4	+1.1	87.0	22	65.2	20.5	4	45.5	66.5	32.4	27	4.5	3	70.7	44.5	1.47	+2.40	6,000	se.	32	se.	14	13	14	10	6	
Omaha.....	1,113	28.81	+0.03	29.09	30.41	19	29.48	25 0.93	59.9	+1.1	84.6	22	64.1	17.8	2	41.8	66.8	32.6	7	10.1	3	68.7	39.7	1.77	+1.78	6,331	se.	34	nw.	26	10	6	15	9	
Valentine.....	2,603	27.23	.....	29.05	30.40	19	29.41	18 0.99	41.8	.....	78.4	18	56.7	12.6	5	33.8	65.8	38.2	17	7.4	2	62.7	30.3	1.39	.....	10,880	se.	60	n.	25	11	13	10	7
Huron.....	1,307	28.54	.....	29.99	30.47	5	29.38	14 1.09	46.1	+1.9	83.2	21	59.3	9.0	2	35.0	74.2	44.8	17	9.2	13	77.0	38.8	5.12	+1.00	7,792	se.	33	nw.	26	11	9	12	9
Yankton.....	1,228	28.63	.....	29.97	30.44	5	29.47	14 0.97	47.6	+2.4	80.1	20	59.8	3.9	2	38.2	76.2	34.7	17	10.1	9	76.1	39.3	5.12	+1.87	7,908	nw.	39	sw.	22	8	7	13	10
Northern slope.																																			
Fort Assiniboine.....	2,720	27.04	.....	29.95	30.44	19	29.54	13 0.90	46.2	+4.0	78.0	12	60.5	16.4	3	33.0	61.6	39.1	8	10.7	17	53.2	28.4	1.83	+1.04	8,397	sw.	37	nw.	15	6	4	14	12
Fort Benton.....	2,681	27.09	.....	29.95	30.47	19	29.46	12 1.01	45.4	+3.3	78.2	12	62.1	19.3	3	33.6	58.9	45.0	20	11.0	17	67.2	35.1	2.01	+1.17	4,306	se.	45	se.	12	8	7	11	12
Fort Custer.....	3,040	26.72	.....	29.90	30.43	19	29.43	13 1.01	46.1	+1.7	76.8	12	60.4	18.9	4	33.7	57.9	40.3	7	10.9	18	59.8	30.5	1.98	+0.92	5,852	se.	36	n.	30	7	5	17	8
Fort Maginnis.....	4,340	25.43	.....	29.93	30.40	19	29.43	12 0.91	41.1	+2.2	72.7	12	54.7	16.2	3	31.1	56.3	36.7	3	7.5	25	59.4	27.4	1.18	+0.51	8,180	nw.	62	nw.	15	11	8	13	9
Fort Shaw.....	3,550	25.24	.....	29.92	30.43	19	29.45	12 0.97	43.2	+4.8	74.9	12	60.0	18.9	4	33.9	56.0	47.5	20	10.4	14	60.0	30.4	2.30	+1.61	5,412	sw.	32	nw.	14	9	5	14	11
Helena.....	4,059	25.72	.....	29.93	30.40	19	29.51	12 0.89	42.9	+0.8	71.2	12	55.4	27.2	27	33.2	44.0	34.2	20	8.2	14	58.2	27.8	2.60	+1.47	8,023	sw.	40	sw.	14	9	5	14	11
Poplar River.....	4,030	25.76	.....	29.97	30.47	19	29.38	15 0.95	45.2	.....	83.0	12	60.3	12.1	2	30.6	71.0	46.3	6	9.6	15	68.9	34.2	0.86	+0.99	7,147	sw.	36	n.	22	6	4	11	15
Deadwood.....	4,600	25.47	.....	29.95	30.46	19	29.52	14 0.98	41.3	+1.6	69.2	17	49.9	14.9	5	34.3	54.3	39.1	17	4.6	26	73.2	32.7	6.72	+1.91	7,279	sw.	26	sw.	21	16	7	15	8
Cheyenne.....	6,105	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Platte.....	2,841	27.00	.....	29.94	30.37	5	29.48	14 0.89	47.2	.....	82.0	18	59.5	16.2	3	37.9	65.8	37.2	17	10.6	2	75.5	39.1	2.09	+0.27	7,958	se.	48	se.	18	11	8	15	7
Fort Laramie.....																																			
Middle slope.																																			
Denver.....	5,294	24.63	.....	29.80	30.34	19	29.42	12 0.92	44.2	.....	74.6	17	56.5	20.5	3	34.6	54.1	35.8	17	12.5	3	60.7	28.4	2.79	+0.73	6,262	n.	32	n.	28	16	12	13	5
Pike's Peak.....	14,134	17.63	.....	29.80	30.20	20	29.52	13 0.66	42.0	.....	27.6	30	17.8	4.2	3	7.6	31.8	15.5	30	4.5	9	87.2	8.9	6.33	+2.83	14,930	w.	88	w.	7	15	7	12	11
West Los Animas.....	8,139	25.97	+0.06	29.80	30.26	5	29.44	12 0.80	48.2	.....	84.3	18	64.4	17.6	5	35.9	76.3	30.5	17	11.1	25	64.3	34.1	2.64	+1.79	7,338	se.	50	se.	18	9	9	14	7
Concordia.....	1,314	28.48	.....	29.95	30.47	5	29.48	25 0.93	51.0	.....	82.8	22	63.0	17.6	5	40.5	65.2	36.3	27	4.2	3	70.0	39.6	3.39	.....	8,359	se.	44	se.	13	11	7	12	11
Dodge City.....	2,517	27.34	+0.03	29.94	30.37	5	29.51	13 0.83	51.0	.....	79.9	18	63.7	18.4	6	39.9	60.6	35.4	7	7.6	4	67.3	38.6	1.90	+0.65	10,997	se.	50	sw.	14	6	6	10	14
Fort Reno.....									59.4	.....	84.1	23	72.3	22.8	5	44.5	61.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fort Supply.....									54.8	.....	84.4	23	69.1	15.4	7	40.6	69.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fort Elliott.....	2,650	27.18	+0.05	29.94	30.32	5	29.58	26 0.74	53.9	.....	78.9	18	67.2	20.3	5	42.4	58.6	36.5	5	7.8	3	62.1	39.1	2.44	+1.00	11,106	se.	50	se.	23	7	4	13	13
Southern slope.																																			
Fort Hill.....	1,200	28.73	+0.02	29.93	30.35	6	29.35	26 0.79	50.7	.....																								

disappeared, but it began to revive again and reached its maximum intensity at 2.25 a. m., after which it began to fade away. No streamers were seen. The effect of the atmospheric electricity was plainly noticeable on the telegraph line, being almost strong enough to work the line without a battery.

Fort Buford, Dakota: an aurora began at 10.17 p. m. of the 20th, having, on its first appearance, an outline of a bank of illuminated smoke, from which, at intervals, streamers of a bluish tint shot up to a height of 75° or 80°. About 10.55 p. m. it assumed the form of a well-defined arch and remained visible until about 11.45 p. m.

Alpena, Michigan: aurora first noticed at 9.30 p. m. of the 20th, consisting of a diffused light in the northwestern horizon from which a few streamers were observed to shoot up to an altitude of about 40°.

Marquette, Michigan: an aurora was observed at 10 p. m. on the 20th, extending across the entire sky, passing a few degrees north of the zenith.

Moorhead, Minnesota: a faint aurora was observed on the 20th at 10 p. m., disappearing at 11.30 p. m. Auroras were also observed during evenings of the 14th and 30th.

Gardiner, Kennebec county, Maine: on the 24th a brilliant aurora appeared at about 10.30 p. m. with faint beams which increased in brightness until 12 midnight; at 1.30 a. m. the aurora appeared in the form of a double arch, the lower one quite near the horizon. Bright streamers shot up from both of the arches until 3.30 a. m., when the aurora was nearly obscured by the moon.

Burlington, Vermont: a very brilliant aurora was observed at 1.00 a. m. of the 25th. It consisted of an orange-colored light extending from northeast to west, rising to an altitude of about 25°. The light produced by the aurora was bright enough to cast a shadow. The western extremity gradually faded out, but in the northwest the aurora was rendered more brilliant by perpendicular rays of light, rising to a height of 30°.

Tatoosh Island, Washington Territory: an aurora was observed on the 25th; at 1.25 a. m. a pale white light was noticed in the north, extending from 20° west of north to 18° east of

north, and having an altitude of 15°. At times a ray of yellow light shot up to an altitude of 22°. Beneath the arch was plainly seen the dark segment which accompanies such displays.

Syracuse, New York: an aurora, extending from northeast to northwest and about 12° above the horizon, was observed during the evening of the 30th.

Auroral displays were also observed during the month, as follows:

1st.—Amherst, Massachusetts; Cresco, Iowa; New Haven, Connecticut; Fort Buford and Webster, Dakota; Saint Paul, Minnesota; Poplar River, Montana; Spokane Falls, Washington Territory.

2d.—Clinton, Iowa; Ithaca, New York.

3d.—Tiffin, Ohio.

4th.—Mackinaw City and Fort Brady, Michigan.

6th.—Pekin, Illinois.

8th.—Mountainville, New York.

11th.—Eastport, Maine; Fort Meade, Dakota; Orono, Maine.

12th.—Duluth, Minnesota.

14th.—Portland, Kent's Hill, and Eastport, Maine; Syracuse and Oswego, New York; Detroit, Michigan; Clinton and Monticello, Iowa; Traverse City, Michigan; Webster, Dakota.

19th.—Charlotte, Vermont; Pekin, Illinois.

20th.—Bar Harbor, Eastport, and Orono, Maine; North Volney, New York; Pekin, Illinois; Duluth, Minnesota; Mackinaw City, Michigan; Fort Meade and Fort Buford, Dakota.

24th.—Portland, Maine; Poplar River, Montana.

25th.—Newport, Vermont.

29th.—Eastport and Kent's Hill, Maine.

30th.—Eastport and Kent's Hill, Maine; North Volney and Syracuse, New York; Duluth, Minnesota; Pekin, Illinois.

REPORT ON THUNDER-STORMS OF APRIL, 1886.

(By Jr. Prof. H. A. Hazen.)

In this report there have been studied all observations from Signal Service stations, voluntary observers, and special thunder-storm observers. A summary of these reports is to be found in the following table:

TABLE I.—Thunder-storms of April, 1886.

District.	State.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	Total.	
I	Connecticut													2							1				4							7	
	Maine																															0	
	Massachusetts																			3				8	1							12	
	New Hampshire																															1	
	New York	1					1							9						2	3			1	4		2	3		1		27	
	Rhode Island																								3							3	
	Vermont																			1								1				2	
	Total	1					1							11						7	4			1	19	1	2	3	1	1		52	
II	Delaware																															0	
	Maryland												2	4							2				10	3						21	
	New Jersey												1	3	1						3				8		4					20	
	North Carolina				1		1																2	2					1	3		7	
	Pennsylvania							1						3	1	2					8	1			16		4					36	
	Virginia and West Virginia													6							3	4				5	1					19	
	Total		1		1		1						3	16	2	2					16	7	2		34	8	9	1	3		7	113	
III	Illinois			1	1									4	4	18	7	1						1	1	4		4		1	7	54	
	Indiana											3		2	2	11				3			1				13			4		40	
	Kentucky			1									1																			6	
	Ohio	1	3							1			1	6	7	2	25	3	2		1	31				26	3	33	3	31	6	185	
	Tennessee		4	2	2	2	2					2			3													3	1		4	2	29
	Total	5	7	3	2	2				1		6	7	13	11	55	10	6		1	34		1	1	27	7	54	4	1	48	8	314	
IV	Michigan													1	3	1	2	3	3		1			11		7						32	
	Minnesota													1	4	3	1				1		3			2	2					17	
	Wisconsin													2		6	2			1	1	1		3		5	5	1				27	
	Total													4	7	10	5	3	3	1	3	1	3	14		7	14	1				76	
V	Dakota													2	5	1					1	1	2									13	
	Iowa													4	2	2	5			1	1		2		2	2		1	6			28	
	Nebraska									1	2	1		4	1						1	1	4			2		1	4			22	
	Total									1	2	1		10	8	3	5				3	2	8		2	4		2	11			63	
VI	Arkansas	1	1	2						1	2		1				3	2									1	1		2			17
	Indian Territory																															0	
	Kansas		3	1						3	9	2		6	2	1	7	4								1	5	7	3	4		6	63
	Missouri		1	1										2	4	3	5	1	1						1	3	2	1		3	1		20
	Total	1	5	4						3	9	4		9	6	4	15	7	1					1	5	8	6	7	2	11	1		109
	Grand total	2	11	11	4	2	4		4	12	5	0	19	60	32	85	27	10	3	10	60	11	19	24	88	34	81	11	27	50	15		727

The total number of storms recorded is seven hundred and twenty-seven; of these two hundred and eighty-eight are from voluntary observers, one hundred and sixty-two Signal Service, and two hundred and seventy-seven special records. It should be noted that in nearly all cases the reports of the voluntary observers enumerate the number of storms, including distant lightning, while in the last two classes distant lightning is omitted. The relative frequency of these storms for each state cannot be determined from the table, as some states have many more stations than others.

There were two specially marked periods of storms, the first from 13-16th with two hundred and the second from 23d-26th with two hundred and twenty-seven storms. There were two periods of lesser activity, 19th-21st with eighty-one and 28-30th with ninety-two storms. The storms of the 13-16th were the most interesting. These were first noted at Assinaboine, Montana, by a storm from 16.33 to 17.15 hours moving from sw. entirely to the west of the station.

The following table indicates several facts in regard to these storms:

TABLE II.

Date.	Station.	First thunder.	Lowest.	Duration.	Coming from.	Going towards.	Rain.	Hail.	Highest wind.		Intensity.
									Direction.	Velocity.	
		<i>Hour.</i>	<i>Hour.</i>	<i>Minutes.</i>			<i>Inches.</i>			<i>Miles.</i>	
April 13	Fort Assinaboine, Mont	16.33	17.05	42	sw.	nw.	.00	0	e.	19	2
	Fort Custer, Mont	17.38	17.45	42	sw.	ne.	Inap.	0	se.	15	3
13	Fort Maginnis, Mont	22.40	22.50	30	e.	nw.	.04	0	sw.	28	2
	Valentine, Nebr	15.20	15.35	15	se.	nw.	.07	0	se.	40	3
	North Platte, Nebr	31.48	22.12	34	e.	se.	.05	0	se.	1	3
	Des Moines, Iowa	20.35	22.30	270	sw.	se.	.14	0	sw.	10	4
	La Crosse, Wis	21.47	21.55	33	se.	nw.	.02	0	se.	12	3
	Leavenworth, Kans	23.25	23.20	4	e.	se.	.04	0	e.	17	3
	Chicago, Ill	15.07	15.07	53	se.	nw.	.07	0	e.	15	3
	Waukegan, Ill	15.15	16.05	75	sw.	n.	.36	Some	se.	Mod.	
	Worthington, Minn	16.00	19.00	300	sw.	ne.	1.25	0	se.	Mod.	2
	Cresco, Iowa	18.15			e.	n.	.04	0	se.	Mod.	
14	Lansing, Mich	15.08	15.15	202	sw.	n.	.05	0	se.	Mod.	
	Fort Yates, Dak	15.40	16.50	140	se.	nw.	.03				5
	Bismarck, Dak	15.47	15.56	118	se.	nw.	Inap.	Some.	se.	19	3
	Saint Paul, Minn	16.37	31.51	493	se.	nw.	1.43	Navy bean.	se. to sw.	27	4
	Fort Totten, Dak	17.30	18.20	90	e.	n.	.20	Small.	se.	32	3
	Independence, Kans	18.00	19.20		sw.	ene.	2.60	Some.	e.	20-30	
	Yates Centre, Kans	18.10	18.30	110	e.	ne.?	.00	0	se.	20-30	
	Duluth, Minn	18.10	19.30	320	sw.	ne.	2.23	0	se.	36	4
	Omaha, Nebr	19.02	19.05	10	e.	w.	.02	Size of peas.	se.	27	3
	Fort Buford, Dak	19.42	21.00	134	e.	w.	.60	0	e.	16	4
	Poplar River, Mont	20.40	20.40	1 clap	sw.	ne.	Inap.	0	sw.	12	3
	Celia, Kans	22.00	24.00	120	w.	e.	.00	Some.	w.		
	Yates Centre, Kans	22.20	23.10	90	e.	nne.	.03	0	se.	20-30	
	Lamar, Mo	22.20			sw.	ne.	.01	0			3

This data is given somewhat in detail, as accompanying these storms were the destructive storms and tornadoes of April 14th, beginning with a small one at Jamestown, Dakota; then the most destructive of all at 15.58 hours at Saint Cloud, Minnesota; the next, at 17.00 hours or a few minutes after, at Coon Rapids, Iowa; then one at Shubert, Nebraska, just before 18.00 hours; and finally one at Monroe, Missouri, about 20.00 hours. Besides the above the newspapers of the Northwest give the names of at least thirty-four towns visited by destructive storms. It will be noticed that the duration of the storms was from a few minutes to more than eight hours. One of the most peculiar facts to be noted is the almost uniform occurrence of the highest wind from the se. A farther study of these conditions is being made.

It is very much desired that as the thunder-storm season approaches voluntary observers devote more attention to the details of these storms, which are now receiving very close attention in all countries. It is especially desired that some note of time be made; if it is impossible to note the first and lowest thunder with duration of storm, then note the approximate time of the passage of the heaviest part. Note the direction from which the storm comes and toward which it moves (it is very difficult to do this oftentimes in the house). The amount of rain, the fall of hail, the direction and approximate force of highest wind, and the intensity of the storm should also be noted. The last point is very important. The following scale of intensity may be used: (1) distant lightning (if no scale is used care should be taken never to include distant lightning with the dates of storms); (2) distant thunder; (3) moderate thunder-storm; (4) heavy thunder-storm; (5) heavy thunder with very high wind, breaking small branches off trees; (6) thunder with hurricane or tornado.

CHART OF ELECTROMETER READINGS.

Prof. T. C. Mendenhall, office of the Chief Signal Officer, has prepared chart vi (which shows the results of observations of the electrometer) and the following notes relating to the subject of atmospheric electricity:

Systematic observations of the electrical conditions of the atmosphere, as shown by the indications of an electrometer, have been carried on at one or two stations for two or three years. Within the past year this work has been greatly extended, and through the generous co-operation of the following institutions of learning and their professors of physics, stations have been established and observations are being made at the Massachusetts Institute of Technology, Yale College, Cornell University, the Ohio State University, and Johns Hopkins University. Regular observations are also made at the office of the Chief Signal Officer, Washington City. At all of these points the water dropping collector is in use. The electrometers are essentially the same, being the Thomson quadrant, as made by White, Carpentier, and others. At Baltimore the record is photographic and continuous. At other stations direct scale readings are made. Preparations are being made for photographic registration at all stations.

Beginning at noon on April 7th, a series of simultaneous observations at intervals of five minutes was kept up at all the above points for a period of seventy-two hours. Direct scale readings as frequent as once in five minutes furnish as satisfactory results as a photographic record, and indeed the method of direct reading has some decided advantages over the use of photography.

The results of these observations have been charted on a common scale, and when those made at different points are brought together they exhibit in some cases similarities of form of great interest. Simultaneous observations during shorter periods of time will be made in the future, and such results as appear to be of importance will be published in the MONTHLY WEATHER REVIEW. In this number chart vi shows some of the results of the series of observations referred to above.

The first two curves exhibit the results of observations at Washington City and Baltimore. The diagrams are self-explanatory. It will be observed that there are evidences of similarity in the general fluctuations, although each station shows considerable local disturbances.

The third curve exhibits simultaneous observations at Washington City and Columbus, Ohio. These stations are widely separated, but for this particular period of six or eight hours, the curves show a decided similarity. It will be remembered that the absolute potential recorded at any station depends so largely on the exposure of the collector that comparisons can only be made of the variations.

At Columbus the collector is exposed from the west side of a large building at a height of about thirty-five feet from the ground. At Baltimore and Washington City the exposure is also from windows at a height of about forty feet, south at Baltimore and north at Washington City.

The last diagram of the chart shows results of observations on two electrometers in Washington City, distant about three hundred feet from each other. The collector connected with one projects from the north side of a large building at a height of forty feet, while that joined to the other was suspended in the air, by means of a tall mast, at a height of about sixty feet from the ground.

and eight to ten feet above the roof of the building on which the mast was placed. The curves of this diagram show that the indications of collectors as near to each other as these were will often give practically identical results. At the same time it should be observed that local differences may, and do exist. Arrangements are now being made for the establishment of a station at the Smithsonian Institution, so that comparative observations at somewhat greater distances may be made.

The Chief Signal Officer recognizes the fact that the subject of atmospheric electricity is involved in great obscurity, but he desires to place some of the results of the observations now under way in the hands of those interested in the subject as early as possible. Much is to be done in the way of systematic observation and investigation before any generalization will be possible.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various states and territories during the month, as follows:

Alabama.—24th.
Arizona.—10th, 19th.
Arkansas.—8th, 12th, 23d, 27th.
California.—2d, 4th, 5th, 8th, 9th, 11th, 14th, 18th, 19th, 21st, 24th.
Colorado.—26th, 29th.
Connecticut.—11th.
Dakota.—4th, 7th, 17th, 25th, 30th.
District of Columbia.—29th.
Florida.—3d, 4th, 10th, 11th, 12th, 28th.
Georgia.—3d, 11th, 17th, 25th, 27th.
Idaho.—4th, 5th, 6th, 26th.
Illinois.—3d, 4th, 6th to 9th, 12th, 14th, 21st, 23d, 26th, 28th.
Indiana.—4th, 5th, 10th, 14th, 22d, 24th, 26th.
Iowa.—5th to 8th, 16th, 17th, 22d, 24th, 27th.
Kansas.—4th, 7th, 10th, 23d, 26th, 29th.
Kentucky.—5th, 10th, 14th, 16th, 17th, 23d.
Maine.—4th, 5th, 14th.
Massachusetts.—10th, 11th, 15th, 27th.
Michigan.—6th, 9th, 14th, 16th, 29th.
Minnesota.—8th, 22d.
Missouri.—8th.
Montana.—1st, 5th, 7th.
Nevada.—4th, 5th, 8th, 9th, 14th, 21st.
New Jersey.—17th, 24th, 28th, 29th.
New York.—8th, 9th, 11th, 15th, 17th, 18th, 19th, 21st, 22d, 23d, 25th, 30th.
North Carolina.—4th, 10th, 11th, 18th, 19th, 24th, 25th, 29th.
Ohio.—2d to 5th, 7th, 8th, 9th, 11th, 14th to 18th, 25th, 29th.
Oregon.—4th, 5th, 25th, 27th, 28th.
Pennsylvania.—3d, 10th, 11th, 14th, 15th, 18th, 24th, 30th.
South Carolina.—3d, 4th, 11th, 21st, 25th, 27th, 28th.
Tennessee.—8th, 9th, 10th, 14th, 18th, 25th, 26th, 27th.
Texas.—2d, 11th, 13th.
Vermont.—4th, 30th.
Virginia.—2d, 10th, 11th, 14th, 20th, 24th, 27th, 29th.
Washington Territory.—5th, 6th, 18th, 19th, 21st, 22d, 27th, 28th.
Wisconsin.—6th, 7th, 8th, 17th, 22d.
Wyoming.—1st, 6th, 7th, 9th, 10th, 11th, 13th, 16th, 25th, 29th, 30th.

LUNAR HALOS.

Lunar halos were observed in the various states and territories, as follows:

Arizona.—10th.
Arkansas.—11th, 16th.
California.—14th, 18th.
Colorado.—13th.
Dakota.—10th, 12th, 13th, 15th.
District of Columbia.—10th, 11th, 12th, 14th, 15th, 19th.
Florida.—11th, 12th, 15th.
Georgia.—10th, 12th.
Idaho.—11th, 16th.
Illinois.—6th, 7th, 9th, 11th, 12th, 15th, 16th, 17th.
Indiana.—1st, 8th, 9th, 13th, 15th, 17th, 18th, 22d, 24th.
Iowa.—12th, 13th, 14th, 23d.
Kansas.—11th, 13th, 14th, 16th.

Kentucky.—9th, 10th, 14th, 16th to 19th.
Louisiana.—11th.
Maine.—12th.
Maryland.—10th, 18th.
Massachusetts.—3d, 9th, 11th.
Michigan.—10th, 11th, 13th, 14th, 16th, 17th.
Minnesota.—12th, 14th, 17th.
Mississippi.—11th, 13th.
Missouri.—11th to 14th.
Nebraska.—15th, 16th.
New Jersey.—10th, 11th, 12th, 17th.
New Mexico.—10th.
New York.—9th, 10th, 12th, 14th to 19th.
North Carolina.—11th, 12th, 15th, 18th, 19th.
Ohio.—12th, 14th to 18th.
Oregon.—19th, 22d.
Pennsylvania.—9th, 12th, 14th.
Rhode Island.—12th.
South Carolina.—10th, 16th.
Tennessee.—7th, 12th, 13th, 14th, 16th.
Texas.—8th to 11th, 13th, 17th, 18th.
Utah.—16th.
Vermont.—12th, 14th.
Virginia.—10th, 11th, 14th, 17th, 18th, 19th.
Washington Territory.—11th, 15th, 16th, 25th.
Wisconsin.—9th, 13th, 14th, 15th, 17th.
Wyoming.—10th, 13th, 14th, 15th.

The phases of the moon (Washington mean time), as given in "The American Ephemeris and Nautical Almanac" for 1886, are as follows: new moon, 3d, 21 h. 22.4 m.; first quarter, 11th, 3 h. 35.8 m.; full moon, 17th, 21 h. 50.9 m.; last quarter, 25th, 12 h. 7.2 m.; apogee, 26th, 11.0 h.; perigee, 14th, 12.4 h.

MIRAGE.

Rochester, New York: on the afternoon of the 10th a very distinct mirage was seen at Rochester. Points nine miles distant, including Mount Hope and surroundings, were plainly discernible from the Rome, Watertown, and Ogdensburg Railroad track, near Charlotte. From the same point of view, the Erie Railroad, eight or nine miles distant, with moving train, was plainly seen.

Port Huron, Michigan: a mirage was observed at 5.30 p. m. of the 21st, northeast of this station; miles of ice and several small vessels could be distinctly seen over Lake Huron.

New Haven, Connecticut, 22d: on Long Island Sound vessels appeared elevated much above their actual position and under them their inverted images were seen; low lying land presented to view high bluffs.

Willcox, Arizona: mirage was observed every day during the month.

Mirage was also observed at the following places:

Duluth, Minnesota, 6th, 18th.
 Mackinaw City, Michigan, 8th, 9th.
 Oswego, New York, 11th.
 Marquette, Michigan, 29th.

MISCELLANEOUS PHENOMENA.

EARTHQUAKE.

Bainbridge Island, Washington Territory: a slight earthquake was felt at 10.05 p. m. on the 16th; it had a tremulous motion and lasted about thirty seconds.

INSECTS.

Mr. John F. Bayerly, voluntary observer at Spartanburg, Spartanburg county, South Carolina, reports that grasshoppers have been seen in large numbers since the 15th.

METEORS.

Charlotte, North Carolina: a meteor was observed at 11.10 p. m. of the 20th. It descended rapidly at an angle of about 15° from the perpendicular. Meteors were also seen at this place on the 8th and 22d.

Walla Walla, Washington Territory: a large meteor was seen to fall from the heavens about 4.30 a. m. of the 19th, as it

passed on its downward zig-zag course it left a long trail of light which gradually faded away into smoke. The meteor was accompanied by a hissing sound and shaped like a large ball of fire. It was seen by a number of people here.

Fort Spokane, Washington Territory: at 7.40 a. m. of the 19th a large red meteor, about the apparent size of the full moon, was observed moving across the southeastern portion of the sky at an altitude of 70°. This meteor did not move in a straight line but in a sinuous course and just before it reached the horizon exploded with a report louder than a cannon.

Mountainville, New York: at 10.20 p. m. of the 22d two meteors were observed, one moving from the zenith toward the southeast, the other may have been a continuation of the first after passing behind a cloud.

Lansing, Michigan: on the 22d a meteor was observed at 9.20 p. m., in the west, midway between the horizon and the zenith. It had a downward southerly course of about 20°; during its passage across the sky it gave a bright light like continuous sheet-lightning. The meteor was visible for several seconds.

Somerset, Bristol county, Massachusetts: 22d, at 8.05 p. m. a meteor passed from near Jupiter to the southwest, leaving a trail of yellowish white haze about 10° long. The meteor was as bright as Jupiter and burst when about 8° above the southwestern horizon.

Chincoteague, Virginia: at 9.58 p. m. of the 22d a large and brilliant meteor shot through the heavens, giving light similar to the flashes of an electric light. Its path was from south to northwest, and was visible seven or eight seconds.

Meteors were also reported in the various states, as follows:

Arkansas.—Lead Hill, 23d.

Florida.—Archer, a meteor was observed on the 27th at 7.45 p. m. as large as Jupiter; Manatee, 7th and 8th.

Illinois.—Charleston, 12th, 21st, and 22d.

Ohio.—Wauseon, 2d.

Virginia.—Marion, 10th.

MIGRATION OF BIRDS.

Geese flying northward.—Eastport, Maine, 1st; Corsicana, Texas, 1st, 2d, 7th; Poplar River, Montana, 1st, 14th; Liberty Hill, Louisiana, and Clayton, New Jersey, 2d; Linkville, Oregon, 3d, 21st to 24th; Saint Vincent, Minnesota, 4th, 9th, 11th, 12th, 14th, 17th, 24th, 30th; Red Bluff, California, 5th, 6th, 7th, 14th, 15th, 16th, 20th, 25th; Albany, Oregon, 6th, 7th, 8th, 10th, 11th, 20th, 23d, 24th, 25th; Albany, New York, and Wakefield, Kansas, 7th; Fort Cœur d'Alene, Idaho, 7th, 17th; Palmyra, New York, and Troy, Pennsylvania, 8th; Fort Assinaboine, Montana, and Worcester, Massachusetts, 10th; Princeton, California, 16th; Ocean City, Maryland, 16th, 24th; Moorestown, New Jersey, 18th; Astoria, Oregon, 18th, 19th, 21st to 24th; Embarras, Wisconsin, 18th, 22d; Bismarek, Dakota, 19th, 20th; Fort Buford, Dakota, 20th; Grand Haven, Michigan, 22d, 23d; Olympia, Washington Territory, 24th; Port Huron, Michigan, 25th, 26th.

Geese flying southward.—Worcester, Massachusetts, 8th; Embarras, Wisconsin, 22d.

Ducks flying northward.—Embarras, Wisconsin, 10th, 11th.

POLAR BANDS.

Polar bands were reported during the month by the following stations:

Wauseon, Ohio, 2d, 3d, 29th.

Portland, Maine, 24th.

El Paso, Texas, 1st, 22d, 25th.

Montrose, Colorado, 3d, 11th.

Riley, Illinois, 23d.

Ninnescah, Kansas, 9th, 21st, 22d, 27th, 28th.

Beverly, New Jersey, 10th.

Cornish, Maine, 27th.

Napoleon, Ohio, 3d.

Stateburg, South Carolina, 10th.

Dale Enterprise, Virginia, 15th, 16th.

Prairie du Chien, Wisconsin, 8th, 13th, 17th, 22d.

Archer, Florida, 27th, 28th.

SUN SPOTS.

Prof. David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for April, 1886:

Date— April, 1886. Standard time.	No. of new.		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 1 p. m.	2	20	0	0	0	0	6	70	
3, 11 a. m.	1	30	0	0	0	0	7	100	
3, 5 p. m.	0	15	0	0	0	0	7	115	
8, 6 p. m.	0	0	0	0	0	0	2	10	
9, 11 a. m.	0	0	0	0	0	0	2	5	Broad areas of faculae.
10, 2 p. m.	2	6	1	4	0	0	3	7	Do.
11, 3 p. m.	0	0	0	0	0	0	3	6	Do.
14, 5 p. m.	1	1	0	0	0	0	1	1	
16, 1 p. m.	1	7	0	0	0	0	2	8	
17, 6 p. m.	0	0	0	0	0	0	2	6	
18, 5 p. m.	1	1	0	0	1	1	2	4	
19, 4 p. m.	2	10	0	0	1	5	4	15	
20, 6 p. m.	1	3	0	0	1	3	5	20	
21, 4 p. m.	1	15	0	0	0	0	6	35	
22, 6 p. m.	0	0	0	0	0	0	6	30	
23, 5 p. m.	0	0	0	0	0	0	5	25	
25, 11 a. m.	0	10	0	0	0	0	4	30	
26, 6 p. m.	0	0	1	2	0	0	3	25	
30, 11 a. m.	3	40	0	0	0	0	7	65	

Faculae were seen at the time of every observation.

‡ Approximated.

Mr. H. D. Gowey, of North Lewisburg, Champaign county, Ohio, reports having observed sun spots on the following dates: 3d, 8th, 9th, 14th, 15th, 16th, 18th to 30th.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and fifty-nine stations show 4,746 observations to have been made, of which one was reported doubtful; of the remainder, 4,745, there were 4,128, or 87.0 per cent., followed by the expected weather.

PRAIRIE AND FOREST FIRES.

North Platte, Nebraska: extensive prairie fires occurred near this place during the 18th, 19th, and 20th, which spread very fast and burnt over a vast area on account of the high wind prevailing.

Saint Paul, Minnesota: a destructive prairie fire swept over the entire northern tier of townships in Goodhue county on the 9th. An immense amount of damage was done, but only a partial list of losses has been reported. Several farmers lost their barns and out-houses, and a large amount of grain was destroyed, besides dozens of cattle, horses, and hogs. So far as reported the total loss will be over \$100,000. The fire was stopped by a heavy rain.

Philipsburg, Centre county, Pennsylvania: 18th, forest fires were seen at 4.30 p. m. in the east-northeast.

Centralia, Columbia county, Pennsylvania: during the 22d and 23d fierce mountain fires raged through the country in this vicinity. Considerable valuable timber was destroyed. Profiting by former years' experience the coal operators removed the brush and timber surrounding the breakers, thus diminishing the danger to valuable coal properties.

Helvetia, Randolph county, West Virginia: 30th, many bush fires have prevailed since the middle of the month, causing some damage.

Fort Yates, Dakota: prairie fires were seen in all directions on the 18th and 24th.

Huron, Dakota: the prairie adjoining the town was on fire during the 18th, destroying a number of barns and out-houses.

Webster, Day county, Dakota: on the 17th a fire swept over the prairie in Linn Lake township, destroying a farmhouse, as well as the out-buildings and stock.

Pike's Peak, Colorado: an extensive prairie fire was seen on the eastern horizon during the 15th.

Fort Reno, Indian Territory: prairie fires were seen every day of the month after the 5th.

Humphrey, New York: forest fire, 23d.

Lynchburg, Virginia: forest fire, 19th.

Yankton, Dakota: the prairie in the vicinity of this place was burning from the 14th to the 24th, inclusive.

Prairie fires have also been reported at—

Fort Sill, Indian Territory, 15th and 19th.

Valentine, Nebraska, 16th, 17th, and 18th.

Fort Assinaboine, Montana, 11th to 14th.

Poplar River, Montana, 5th, 8th, 11th, 12th, and 13th.

Saint Vincent, Minnesota, 13th, 16th, 17th, 18th, 24th.

Fort Supply, Indian Territory, 7th, 14th, and 15th.

Concordia, Kansas, 15th.

Fort Elliott, Texas, 1st and 2d.

Ninnescah, Kansas, 20th.

Fort Stockton, Texas, 3d.

Midland, Texas, 24th.

SAND STORMS.

Fort McDowell, Arizona, 11th.

El Paso, Texas, 3d, 8th, 12th, 13th.

Yuma, Arizona, 11th, 13th, 19th, 27th.

WATER-SPOUTS.

Schooner "Emily Shepard," E. Coggins, commanding, reports: "Water-spout passed to north of vessel from northeast to southwest at 3 p. m. on the 8th, in N. 32°, W. 73° 30'."

Captain A. M. Shaw, of the brigantine "Achsa," observed a large water-spout within a quarter of a mile of the vessel at 5 p. m. April 22d, in N. 28° 30', W. 70° 15'.

S. S. Craigendoran, April 22d, at 11 a. m., in N. 28° 10', W. 79° 38', observed a large water-spout trending in a northerly direction; a moderate northeast breeze and fair weather prevailed at the time. The diameter of the water-spout was about sixty feet.

ERRATA.

In the REVIEW for February, 1886, page 55, table of "Meteorological record of voluntary observers and Army post surgeons," Stratford, Vermont, minimum temperature 24°, should read -24°.

In the December, 1885, REVIEW, page 306, table of "Temperature of water," Boston, Massachusetts, "Observations interrupted by ice from 7th to 31st," this note should refer to Sandusky, Ohio, Boston record being unbroken during the month.

Meteorological record of voluntary observers and Army post surgeons, April, 1886.

The maximum and minimum temperatures at stations marked thus (*) are from readings of other than standard instruments.

Stations.	Temperature.				Stations.	Temperature.			
	Maximum.	Minimum.	Mean.	Rainfall.		Maximum.	Minimum.	Mean.	Rainfall.
<i>Alabama.</i>	0	0	0	Inches	<i>California—Cont'd.</i>	0	0	0	Inches
Birmingham *	83	31	61.8	5.19	San Rafael	83	32	53.3	8.30
Greensborough	82	37	63.6	6.97	Santa Barbara	74	38	55.7	3.40
Mount Vernon B'ks.	88	34	65.4	7.11	Susanville	71	32	43.9	1.15
Prattville	84	32	61.5	5.34	<i>Colorado.</i>				
<i>Arizona.</i>					Colorado Springs	75	20	44.7	4.82
Huachuca, Fort	79	34	56.5	trace.	Lewis, Fort	65	16	39.6	2.74
Lowell, Fort	91	33	65.3	0.14	Pueblo	79	21	49.6	1.71
McDowell, Fort	91	33	63.9	0.20	Salida	70	15	42.3	3.74
Tucson				0.06	<i>Connecticut.</i>				
Verde, Fort	81	33	58.9	trace.	Bethel				2.02
<i>Arkansas.</i>					Hartford	84	27	49.1	3.35
Lead Hill *	91	29	60.0	5.44	North Colebrook *	77	25	45.7	1.50
<i>California.</i>					Voluntown	82	30		2.52
Alcatraz Island	72	45	53.2	4.20	<i>Dakota.</i>				
Angel Island	78	40	55.4	5.43	Abr. Lincoln, Fort	83	9	45.9	1.44
Benicia Barracks	73	43	55.2	4.76	Meade, Fort	78	12	43.7	2.17
Bidwell, Fort	72	25	44.6	2.20	Pembina, Fort	82	2	43.8	2.85
Cahuenga				3.00	Randall, Fort	84	4	49.5	3.39
Gaston, Fort	89	34	53.1	9.23	Richardton	75	13	43.9	2.40
Hydesville				9.15	Sisseton, Fort	79	4	40.1	3.06
Mason, Fort	70	50	58.7	5.08	Sully, Fort	82	13	48.4	2.32
Murieta *	78	34	54.1	3.79	Totten, Fort	83	0	43.3	1.03
Nicolaus *	74	47	56.6	4.93	Vermillion				3.60
Oakland	77	39	54.4	5.11	Webster	81	0	49.5	7.72
Oroville *	82	44	60.3	5.45	Yates, Fort	81	10	46.8	2.80
Poway	78	45	56.2	2.67	<i>District of Columbia.</i>				
Presidio of San F	80	38	53.9	4.86	Distributing Res'r *	86	37	58.5	5.43
Princeton *	82	35	56.2	3.53	Kendall Green	84	35	54.4	5.38
Sacramento *	83	36	58.4	4.12	Receiving Res'r *	85	36	57.7	4.45
Salinas	75	38	51.7	3.83	Rock Creek Bridge *	92	37	60.2	

Meteorological record of voluntary observers, etc.—Continued.

Stations.	Temperature.				Stations.	Temperature.			
	Maximum.	Minimum.	Mean.	Rainfall.		Maximum.	Minimum.	Mean.	Rainfall.
<i>Florida.</i>					<i>Maryland.</i>				
Archer *	90	37	63.3	4.19	Cumberland	80	30	54.8	2.18
Gatlin, Fort	88	45			Falloon *	84	32	52.1	2.53
Limosa *	93	47	70.6	3.28	Great Falls	88	33	55.7	4.21
Manatee *	90	51	75.0		McDonogh	83	30	59.4	2.11
Meade, Fort				4.10	McHenry, Fort	84	33	54.1	2.68
Merritt's Island	85	49	67.0	8.90	Woodstock	84	28	53.5	2.17
St. Augustine, Fort.	85	45	64.8	3.79	<i>Massachusetts.</i>				
Tallahassee *	83	38	67.3	2.15	Amherst a *	83	31	50.8	2.06
<i>Georgia.</i>					Amherst b	83	21	50.4	1.72
Athens	80	31	61.8	4.59	Blue Hill Obs'y	79	24	45.8	2.16
Dahlonega *	84	28	61.3	4.06	Deerfield	83	24	49.9	3.62
Forsyth *	86	36	64.1	1.88	Dudley	78	25	50.4	1.64
Milledgeville	86	31	63.8	1.29	Fall River	75	26	47.7	2.10
Quitman *	84	40	63.5	2.50	Mendon *	80	30	49.6	
<i>Idaho.</i>					Milton	76	31	47.5	3.56
Boise Barracks	76	29	49.6	1.59	New Bedford	74	27	46.9	2.11
Coeur d'Alene, Fort.	70	26	45.9	1.50	Princeton	78	21	46.1	2.85
<i>Illinois.</i>					Somerset *	84	26	50.2	2.08
Anna *	84	27	58.2	3.45	Taunton	84	20	49.1	2.14
Bloomington	81	20		1.87	Worcester *	76	25	47.4	2.26
Collinsville	84	26	56.6	1.71	Westborough *	83	27	51.5	2.40
Charleston *	84	25	55.6	2.73	Williamstown	70	23	48.2	1.56
Geneseo *	80	10	52.4	2.17	<i>Michigan.</i>				
Mattoon *	84	25	57.0	2.30	Birmingham	80	17		1.96
Pekin *	83	18	50.5	2.71	Brady, Fort	76	0	41.9	2.04
Peoria	88	23	57.7	2.75	Harrieville *	78	5		3.22
Riley	78	8	47.4	3.70	Hudson	83	12		1.19
Rockford *	77	4	48.5	4.36	Kalamazoo	80	19		1.13
South Evanston	83	12	43.5	2.16	Lansing	80	10	50.2	1.51
Sycamore	76	3	48.3	5.14	Mottville	83	16		2.06
Windsor	83	22	54.5	2.17	Pentwater	79	3	45.8	1.80
<i>Indian Territory.</i>					Thornville	83	18	49.8	2.84
Reno, Fort	84	22	58.5	2.80	Traverse City *	82	4		2.48
Supply, Fort	83	21	55.6	1.73	<i>Minnesota.</i>				
<i>Indiana.</i>					Minneapolis	81	14	49.2	3.62
Fort Wayne *	85	26	55.0	2.82	Northfield	79	14	49.0	7.31
Jeffersonville	84	30	57.5	2.83	Preston *	83	19		
Knightstown	86	23	52.8	1.77	Snelling, Fort	82	14	49.8	4.80
Laconia	92	26	57.4	3.99	<i>Missouri.</i>				
Lafayette	82	19	53.9	1.80	Carthage	87	26	58.7	1.54
LaGrange	80	18	51.7	2.13	Central College	84	24	55.9	3.57
Logansport *	85	26	57.7	2.20	Centreville	84	19		4.20
Mauzy	79	15	50.7	3.35	Conception *	80	18	49.7	2.70
Spiceland	81	22	53.3	2.20	Springfield *	81	21	53.4	2.90
Sunman *	84	21	55.5	4.14	Warrenton *	83	25	56.7	
Terre Haute *	81	29		2.44	<i>Montana.</i>				
Vevay	85	28	55.9	2.55	Assinaboine, Fort.	79	0	47.7	1.83
<i>Iowa.</i>					Ellis, Fort	74	20	40.8	3.78
Bancroft	84	12	49.0	3.01	Keogh, Fort	77	16	51.2	0.26
Cedar Rapids a *	82	20	51.5	2.16	Missoula, Fort	66	26	45.4	1.04
Cedar Rapids b *	81	11	51.0		Shaw, Fort	74	19	44.9	2.30
Clinton *	82	4	51.3	1.93	<i>Nebraska.</i>				
Cresco	80	15	48.1	2.37	Crete	82	17	50.1	4.20
Des Moines	82	17	52.0		De Soto *	85	17	51.0	2.23
Independence *	76	21	50.4	1.78	Fairbury				3.88
Logan	84	18	52.5	2.10	Fremont *	78	16	49.2	3.89
Fort Madison	80	25		1.40	Genoa	82	15	48.3	2.21
Manchester	81	17	52.0	2.01	Hay Springs *	78	5	40.0	1.83
Monticello *	82	14	50.9	1.80	Marquette				2.44
Mount Vernon *	88	20	55.0		Niobrara, Fort	90	15	46.0	2.21
Muscataine	86	15	50.3	2.62	Robinson, Fort	76	13	46.6	0.47
Oskaloosa a *	87	20	52.0	3.25	Sidney, Fort	77	17	42.6	0.64
Oskaloosa b *	82	21			Stockham				1.60
<i>Kansas.</i>					<i>Nevada.</i>				
Allison	83	20	49.1	4.54	Carson City	74	20	47.5	0.25
Atchison *	84	22	53.4	2.32	Halleck, Fort	69	20	42.8	1.18
El Dorado	83	22	50.8		McDermitt, Fort	69	20	42.5	2.02
Elk Falls				1.73	<i>New Hampshire.</i>				
Emporia *	81	18		2.48	Antrim				1.70
Fort Scott	87	28	56.8		Ashland				1.43
Hays, Fort	83	13	49.6	3.16	Belmont				1.41
Independence *	89	24	55.3	4.98	Berlin Mills	79	22		1.20
Manhattan a *	86	18	54.8	4.34	Bristol				1.61
Manhattan b *	88	18	53.7	4.70	Lake Village				2.19
Ninnescah	85	23	57.2	1.22	Nashua	84	23	48.8	1.62
Riley, Fort	87	19	55.6	2.68	Wier's Bridge				1.54
Salina	86	18	50.8	1.09	Wolfsborough				2.20
Sterling	82	20	53.7	4.50	Woodstock				1.55
Topeka b *	85	16	53.5	1.59	<i>New Jersey.</i>				
Topeka a *	88	19	58.7	1.74	Beverly *	85	30	50.6	5.48
Wakefield *	91	21	53.9	4.31	Clayton *	86	31	51.8	2.66
Wellington	85	19	54.3	3.25	Dover *	84	27	48.8	3.39
W. Leavenworth *	85	26		1.01	Egg Harbor City	90	3	52.0	9.20
Westmoreland *	82	11		5.75	Moorestown	84	28	50.9	3.16
Wyandotte	80	19	49.5	1.80	Paterson *	85	33	49.8	3.83
Yates Centre	82	24	53.7	1.70	Princeton	82	29	52.0	2.99
<i>Kentucky.</i>					Readington *	88	32	55.3	
Frankfort	85	28	56.4	5.44	South Orange *	89	32	51.4	3.00
Penrod *	88	28			Vineland	73	32	53.9	2.52
Richmond	80	28	55.3	3.98	<i>New Mexico.</i>				
<i>Louisiana.</i>					Bayard, Fort	82	23	54.7	
Grand Coteau	84	40	67.8	8.74	Gallinas Spring	79	30		1.75
Liberty Hill	79	50	70.5	3.77	Puerto de Luna	78	32	54.1	0.39
Luling *	85	38		6.41	Selden, Fort	91	33	62.9	
<i>Maine.</i>					Union, Fort	74	12	46.2	3.22
Bar Harbor	76	25		1.07	Wingate, Fort	74	21	45.6	1.08
Buckfield *	80	25		1.12	<i>New York.</i>				
Cornish *	77	21	46.1	3.08	Auburn	77	33	49.3	3.69
Gardiner	74	23	44.5	1.43	Columbus, Fort	82	29	49.7	3.48
Kent's Hill	79	23	42.5	1.70	Cooperstown *	75	24	46.0	1.86
Orono *	76	19	43.6	1.50	David's Island	86	29	49.2	1.75
					Factoryville	80	24	46.5	2.68

Meteorological record of voluntary observers, etc.—Continued.

Stations.	Temperature.			Rainfall.	Stations.	Temperature.			Rainfall.
	Maximum.	Minimum.	Mean.			Maximum.	Minimum.	Mean.	
<i>New York—Cont'd.</i>	°	°	°	<i>Inches</i>	<i>South Carolina.</i>	°	°	°	<i>Inches</i>
Humphrey	74	30	45.0	3.28	Aiken	84	35	65.3	3.10
Ithaca	79	33	49.4	1.97	Kirkwood	81	37	60.6	3.01
LeRoy	80	21	48.4	4.22	Pacolet	80	31	61.0	3.78
Madison Barracks	74	30	46.2	1.84	Spartanburg	80	31	61.0	4.20
Menard Station	81	26	50.2	3.86	Stateburg	86	35	63.6	1.41
Mountainville	83	26	47.7	4.61	<i>Tennessee.</i>				
Niagara, Fort	78	20	44.1	1.36	Ashwood	83	32	59.0	2.86
North Volney	78	24	47.0	2.13	Milan	85	32	58.9	4.68
Palermo	77	25	49.4	2.13	Paris	80	32	56.2	
Palmyra	78	31	49.3		<i>Texas.</i>				
Penn Yan				3.64	Austin	86	36	68.7	5.04
Plattsburg Bks	73	30	45.3	3.06	Clark, Fort	93	34	69.9	0.43
Setauket	72	29	45.3	4.21	Comfort				1.77
Syracuse	80	26	46.0	4.21	Concho, Fort	93	30	69.0	0.48
West Point	86	32	50.9	3.70	Cornicana				3.95
White Plains	76	35	50.9	3.04	McIntosh, Fort	94	40	75.0	1.50
<i>North Carolina.</i>					Midland	86	39	64.0	0.39
Chapel Hill	93	33	59.6	5.99	Ringgold, Fort	108	35	75.0	trace.
Flat Rock				3.21	New Uin	84	38	66.6	2.01
Lenoir	83	32		3.30	Silver Falls	84	23	68.7	1.87
Lincolnton	34	55.8	5.14		<i>Vermont.</i>				
Raleigh	80	40	60.0	4.80	Brattleborough	83	24	51.7	3.29
Reidsville	92	37	52.8	1.60	Burlington	80	21	45.4	1.66
Statesville	86	34	58.9	4.10	Charlotte	82	22	54.8	2.90
Wake Forest	88	32	60.1	3.38	Dorset	79	17	46.4	2.06
Weldon	89	41	59.3	2.06	Lunenburg	78	28	44.1	0.75
<i>Ohio.</i>					Newport	79	20	45.4	2.35
Cleveland	88	34	54.5	2.49	Post Mills Village	81	20	44.5	
College Hill	93	37	59.3	3.63	Poultney	84	18	43.5	2.33
Fostoria	86	25	52.1	1.30	Stratford	78	20	45.3	2.60
Garrettsville	81	10	49.5	2.13	Stowe				3.11
Hiram	80	25	50.4	1.52	<i>Virginia.</i>				
Jacksonborough	86	26	53.3	5.30	Accotink	87	36	55.8	1.99
Napoleon	80	20	50.9	3.30	Old's Nest	89	40	57.9	2.05
North Lewisburg	83	30	55.2	2.25	Burlington				2.50
Ruggles	80	19	53.8	3.20	Dale Enterprise	88	39	59.1	3.90
Tiffin	84	15	50.3	2.32	Marion	80	28	54.2	3.40
Wauseon	84	14	50.8	3.19	Monroe, Fort	85	35	59.0	2.22
Westerville	80	13	52.7	1.91	Snowville	80	24	53.0	3.90
Yellow Springs	83	19	53.8	3.98	Summit	87	32	54.9	
West Milton	86	23	53.5	4.00	University of Va	79	39	58.5	3.11
<i>Oregon.</i>					Variety Mills	86	36	54.8	3.15
Albany	73	39	59.1	2.95	Wytheville	80	37	54.0	5.15
Bandon	92	34		4.65	<i>Washington Territory.</i>				
East Portland	70	38		3.04	Bainbridge Island	70	36	50.0	2.37
Eola	69	35	48.9	3.74	Pleasant Grove	79	24	48.0	0.98
Gardiner	78	37			Spokane, Fort	75	29	49.0	0.08
Klamath, Fort	69	17	41.1	2.03	Tacoma	64	32	47.4	3.67
Pendleton	71	35	58.1	0.63	Townsend, Fort	63	33	50.2	1.64
<i>Pennsylvania.</i>					Walla Walla, Fort	70	28	54.2	0.92
Altoona				3.16	<i>West Virginia.</i>				
Bethlehem	83	39		2.96	Helvetia	84	28	51.5	3.44
Blooming Grove	83	26	50.2	3.60	Clarksburg	90	30		2.17
Catawissa	82	26	54.2	3.37	Parkersburg	84	31	53.2	2.86
Driftton	82	23	49.3	4.11	<i>Wisconsin.</i>				
Dyberry	79	23	46.5	1.89	Embarras	80	10	48.4	2.55
Easton				3.37	Fond du Lac	78	5	44.4	1.56
Fallington	81	29	51.2	4.09	Madison	77	8	47.0	2.45
Franklin	78	18	45.4	4.24	Manitowoc	76	9	43.8	2.00
Germanstown	84	31			Neillsville	75	1	39.6	0.90
Grampian Hills	82	24	51.0	3.44	Prairie-du-Chien	83	19	52.1	2.10
Phillipsburg	76	25	50.7	0.76	<i>Wyoming.</i>				
Quakertown	77	29	50.3	3.44	Bridger, Fort	63	15	38.5	1.34
Troy	77	23	48.7	3.12	Fred Steen, Fort	71	19	40.1	1.08
Wellaborough	83	30	52.0	10.77	Laramie, Fort	77	11	44.8	0.47
West Chester	83	27	51.5	3.80	Washakie, Fort	60	11	41.9	3.13
Wyoost	79	28	53.5	2.88					
Zionsville	86	30	54.4	1.13					

NOTES AND EXTRACTS.

The following is an extract from the April, 1886, report of the "Alabama Weather Service," under direction of Prof. P. H. Mell, jr., of the Agricultural and Mechanical College, Auburn:

The month presented few features calling for special notice, and but little can be added to the data so carefully collected by the observers and given in the published tables.

The mean temperature of the state was only 0° above the normal.

There was a heavy rainfall on the 28th that was evidently produced by the storm-centre reported on the Texas coast on the 27th. This low depression passed over the state during the 28th, and disappeared off the Carolina coast on the morning of the 29th. During the first week of the month as much as 4.00 inches of snow (unmelted) fell in the northern portions of the state.

The average precipitation was 1.42 inches below the normal.

State summary.

Temperature.—Mean temperature, 62°; highest temperature, 92°, at Selma, on the 23d; lowest temperature, 25°, at Valley Head, on the 8th; range of temperature, 67°; greatest monthly range of temperature, 58°, at Valley Head; least monthly range of temperature, 38°, at Springfield; mean daily range, 16°; greatest daily range of temperature, 39°, at Gadsden, on the 2d; least daily range of temperature, 0°, at Grove Hill, on the 27th.

Precipitation (inches).—Mean depth of rainfall, 4.67; mean daily rainfall, 0.16; greatest depth of monthly rainfall, 10.30, at Evergreen; least depth of monthly rainfall 1.68, at Lafayette; greatest daily rainfall average for state, 1.33, on the 28th; greatest daily local rainfall, 4.52, at Evergreen, on the 17th.

Average number of days on which rain fell, 8; average number of cloudy days, 10; average number of fair days, 9; average number of clear days, 11.

Warmest days, 22d, 23d, 24th; coldest days, 5th, 6th, 8th.

Prevailing direction of wind, southeast.

The following is an extract from the "Bulletin of the Colorado Meteorological Association" for April, 1886, prepared under direction of Prof. F. H. Loud, Colorado Springs, Colorado:

At a meeting of the Colorado Meteorological Association held at Denver March 23, 1886, action was taken for the organization of a state weather service for Colorado, and it was deemed best to begin forthwith to issue periodical summaries of weather records from the state at large, drawn from the observations of a few gentlemen, mostly members of the association, who were known to be ready to contribute their assistance. In this way it was believed the notice of other persons interested in the same subject would be secured and observers found in every part of the state to join the association or to aid in its work for the public welfare. It has been determined accordingly to contribute during the coming summer to newspapers of the state a weekly record of the weather and to begin a series of monthly bulletins to be issued to observers and to members of the association. The present is the first number of the proposed series. The weekly publications in the newspapers were begun April 13th. A number of new observers have already volunteered and the United States Signal Service has directed that full reports be sent from all its stations in the state and vicinity, and has also promised such arrangements as will enable all observers of the association to forward their notes of observations free of postage.

Weather of April, 1886.

During the month there have been, as is usual at this season, frequent light falls of rain and snow. Cloudy weather has been interrupted by short periods during which clear skies have prevailed. One such interruption occurred on the 5th and 6th (following close after the monthly minimum temperatures), and another on the 10th—in each case with a high barometer. A third and longer one occurred from the 14th to the 18th, during which the atmospheric pressure, beginning at a low point, reached a maximum and again declined. This decline was accompanied by a high temperature, the highest, at most stations, for the entire month. Upon the ensuing rise of the barometer a heavy fall of rain, snow, and hail set in, including the 19th, 20th, and 21st of the month. So large was the rainfall on these three days that the situation of a station as more or less central in respect to their precipitation appears to go far towards determining whether the total rainfall for the month there is or is not much in excess of the usual amount. At Colorado Springs the wind was north during the first thirty hours of the rain, while on Pike's Peak it blew from the east and southeast on the 19th and 20th. During the following week the weather throughout the state was rainy, while the 29th and 30th were pleasant, introducing a period of sunshine which extended far into May.

The following meteorological summary for April, 1886, has been forwarded by Hon. J. T. Henderson, Commissioner of Agriculture for Georgia:

Districts.	Temperature.			Precipitation.
	Highest.	Lowest.	Mean.	
Northern Georgia	86.0	29.0	59.6	4.51
Middle Georgia	86.0	30.0	60.7	1.89
Eastern Georgia	83.0	33.0	63.0	1.87
Southeastern Georgia	82.0	44.0	67.0	1.15
State	86.0	29.0	62.6	2.36

The month of April has been unusually dry in the middle and southern portions of the state, and the moisture with some lands has not been sufficient for the germination of seeds. The rainfall, except in north Georgia, is less than half the usual amount for April, and most of this fell about the beginning and at the end of the month.

The following is an extract from the April, 1886, "Monthly Weather Review" of the Illinois Weather Service, under direction of Mr. Charles F. Mills, of the Illinois Department of Agriculture, Springfield:

This "Review" contains a general summary of the conditions which prevailed over Illinois during the month of April, 1886, based upon the reports received from the Signal Service and voluntary observers reporting to the Illinois Department of Agriculture.

The state covers such an extended area from north to south (385 miles) that it has been found advisable to divide the same and follow the judicial divisions, which include the following territory, viz.: the northern division extends from

42° 30' to about 40° 31'; the central division, from about 40° 31' to about 39°; the southern division, from about 39° to 36° 51'.

Atmospheric pressure.—Of the twenty-three stations reporting, the highest pressure occurred on the 19th, at twenty; on the 20th, at two; and on the 9th, at one. At Vandalia, Fayette county, the highest point marked was the same on the 19th and 20th. The lowest pressure was on the 1st, at six stations; on the 26th, at twelve; on the 28th, at two; and on the 2d, 3d, and 5th, at one station each.

The highest pressure reported in April during the past five years, was as follows: 1882, 30.348 inches; 1883, 30.450; 1884, 30.450; 1885, 30.390; 1886, 30.600. The lowest barometer in April for the same period was as follows: 1882, 28.810 inches; 1883, 29.007; 1884, 28.830; 1885, 29.287; 1886, 28.560. The mean barometer for the same months was: 1882, 29.723 inches; 1883, 29.894; 1884, 29.898; 1885, 29.965; 1886, 29.821.

It will be seen that the extremes of the barometer in April, 1886, exceeded those of any of the preceding four years.

Temperature.—The month of April was warmer than usual, its mean temperature being above the average at all but three of the stations from which reports have been received for a number of years.

The mean temperature was above the normal at the following stations, viz.: Marengo, McHenry county, 3°.20 above; Sycamore, DeKalb county, 2°.21; Aurora, Kane county, 3°.57; Prairieville, Lee county, 7°.50; Oneida, Knox county, 1°.81; Oquawka, Henderson county, 3°.54; Keokuk, Iowa, 2°.19; Philo, Champaign county, 2°.07; Springfield, Sangamon county, 2°.86; Mattoon, Coles county, 3°.43; Whitehall, Green county, 2°; Collinsville, Madison county, 3°.30; Centralia, Marion county, 7°.06; Saint Louis, Missouri, 3°.42; Fairfield, Wayne county, 2°.50; McLeansborough, Hamilton county, 0°.22, and Anna, Union county, 0°.52.

The three stations where the mean temperature was below the average, were: Pana, Christian county, 1°.45 below; Vandalia, Fayette county, 1°.69; Cairo, Alexander county, 0°.52.

The mean temperature of April for twelve years past was 51°.35, which was 3°.27 below the mean temperature of April, 1886. April, 1886, was the warmest month of the twelve, excepting April, 1878, whose mean temperature was 56°.09. The lowest mean temperature of any April during the past twelve years was 45°.31, in April, 1881.

The highest temperature of the month was reported on the 23d at thirty-five stations, on the 22d at fifteen, on the 24th at seven, on the 21st at four, on the 20th at two, on the 14th and 19th at two each, and on the 18th and 25th at one station each.

In the northern division of the state the highest temperature occurred on the 23d at thirteen stations, on the 22d at six, and on the 21st at three.

In the central division the highest temperature was on the 24th at two stations, the 23d at eight stations, on the 22d at eight, on the 20th at two, and on the 14th, 19th, 21st, and 23d at one station each.

The highest temperatures reported from the southern division were on the 24th at five stations, on the 23d at fourteen, on the 22d at two, on the 20th, 19th, 18th, and 14th at one station each.

The lowest temperature in April, 1886, was reported on the 5th at twenty-seven stations, on the 2d at twenty-two, on the 3d at seven, on 1st and 4th at four stations each, and the 6th at two stations.

In the northern division of the state the lowest temperature was reported on the 1st at three stations, on the 2d at sixteen, on the 3d at one, and on the 4th at one station.

In the central division the lowest temperature was on the 1st at one station, on the 2d at three, on the 3d at four, on the 4th at two, on the 5th at twelve, and on the 6th at one station.

The lowest temperature in the southern division occurred on the 2d at three stations, on the 3d at two, on the 4th at one, on the 5th at fifteen stations, and on the 6th at one.

Precipitation.—The rainfall in April, 1886, averaged 3.20 inches for the fifty-two stations reporting. This was 0.05 inch less than the average April precipitation of twelve years past. The April, 1886, rainfall was less than that of the corresponding month in 1876, 1877, 1878, 1880, 1882, 1883, and 1885, and greater than that of April, 1875, 1879, 1881, and 1884.

The greatest precipitation at any station in April was 6.80 inches, at Mascoutah, Saint Clair county. The least precipitation was 1.29 inches, at Chicago, Cook county.

A much larger amount of snow fell in April, 1886, than in April, 1885, the average for the state being 4.38 inches. This was distributed as follows: Northern division, 1.18 inches; central division, 2.99 inches; southern division, 7.50 inches. Most of the snow fell from the 1st to the 3d, and melted rapidly.

Wind.—The prevailing directions of the wind were south and southeast.

The following summary for April, 1886, is taken from the report of the "Minnesota Weather Service," under direction of Prof. Wm. W. Payne, Carleton College, Northfield:

Temperature.—The average mean temperature of Minnesota for April, deduced from reports received from the stations of the Minnesota Weather Service, is 47°.5. This is 20°.7 warmer than the preceding month of March, 4°.9 warmer than April, 1885, and much warmer than the average for the month throughout the state, except in the immediate vicinity of Lake Superior, where the weather remained cool throughout the month. The following averages above the normal are given: La Crosse, 5°.0; Saint Paul, 4°.1; Moorhead, 6°.0; Saint Vincent, 8°.2. Duluth was 1°.3 colder than the average of the last sixteen years. The cold weather of the last days of March was

continued during the first four days of the month, with clear weather and generally prevailing northerly winds. During the 5th the wind generally shifted to a southerly direction, the temperature rose rapidly, and a long season of warm, balmy, spring-like weather prevailed, during which vegetation of all kinds made such rapid progress that by the 20th the season was fully three weeks earlier than usual. After the 24th the weather became much cooler, but not unseasonably so, and many stations reported no frost after the 8th of the month.

Precipitation.—The precipitation has in general been copious in amount, though somewhat unequally distributed, some stations having a large excess, notably so: Northfield, 7.31; Moorhead, 5.49; and Albert Lea, 5.08 inches. The long drought in the central-western portion of the state was generally ended during the month. During the first part of the month the precipitation was small and unimportant in amount. On the 13th and 14th the state came within the influence of an area of low pressure, which produced violent thunder-storms, hail storms, and tornadoes, accounts of which will be found in another part of this report. Heavy rains were at Dodge Center, 2.10 inches; Albert Lea, 1.54 inches; Red Wing, 2.71 inches; Duluth, 2.43 inches; and Northfield, 4.04 inches. From the 21st to end of month the weather was in general cloudy and cool, with much rain, especially in northwestern districts, where there was a large excess of precipitation, thoroughly wetting the land and temporarily suspending farming operations.

Tornadoes.—The most important meteorological feature of the month was the tornado which on the 14th devastated the towns of Saint Cloud, Sauk Rapids, and the adjacent country. This phenomenon, aside from its normal characteristics, was remarkable from the unusual fact that it occurred very near the northern limit of tornadoes, but one well-defined tornado having been known to occur north of the main line of the Northern Pacific Railway. Also for its occurrence so early in the year, July and August being the season when they are most likely, if at all, to occur in this latitude, and the fact that this was the most northerly point at which a destructive tornado has been known to occur within the limits of the United States. Perhaps an adequate explanation of the cause of this tornado can be traced to the abnormal conditions of the weather which immediately preceded its occurrence. From April 4 continuous south winds had prevailed over that part of the country between the ninetyeth and one hundredth and fifth meridians and from the Gulf of Mexico far north into British America, thus giving rise to the conditions of heat and moisture in Minnesota which normally belong at that season to the latitude of Tennessee. These features on the 13th and 14th were accentuated by the approach of an area of low pressure which first made its appearance in central California on the morning of the 11th, there producing heavy rains from San Diego northward. On the morning of the 12th this low area was central at Salt Lake City, after which the movement of translation, instead of taking the usual path to the northeast over the Lake region, during the succeeding three days took a slow, erratic, and unusual course over eastern Montana, northwestern Dakota, and passed beyond the limits of observation in the direction of Hudson's Bay on the 15th. It was during the afternoon of the 14th, when this low area was central in northwestern Dakota, and Minnesota was brought into the proper relation to the storm-centre for the occurrence of tornadoes, that the violent and destructive tornado, which did so much damage and caused the loss of over seventy lives, occurred at Saint Cloud and Sauk Rapids, full and accurate accounts of which have been given through the medium of the daily press. On the same date severe local storms occurred throughout the state, notably near Park Rapids in Hubbard county, near Alexandria in Douglas county, at Arlington, Sibley county, where a strong southerly gale and heavy rain prevailed about 3 p. m., and in Dakota county, twelve miles south of Hastings, where a storm, supposed to be of a tornadic nature, destroyed a number of dwellings and barns, but without loss of life so far as learned.

As regards the frequency of occurrence of tornadoes in Minnesota, an examination of the records of known tornadoes shows that the greatest number observed is in northeast Kansas, with sixty-two, the region of greatest frequency. Minnesota, south of latitude 43° 50', twenty-five; Minnesota, south of latitude 44° 30', twenty; Minnesota, south of latitude 45°, fifteen; and then diminishing rapidly in number to latitude 46° 30' where the number is reduced to one only. Thus it is seen that that part of the state north of the 46° 30' is practically exempt from tornadoes, but with a rapid increase in number from latitude 46° to the southern boundary of the state, where, however, they are much less frequent than in Kansas, Iowa, Illinois, Missouri, and New York.

The following meteorological summary and accompanying remarks are from the April, 1886, report of the "Indiana Weather Service," under direction of Prof. W. H. Ragan, of De Pauw University, Greencastle:

Districts.	Temperature.			Average precipitation.
	Highest.	Lowest.	Monthly means.	
Northern counties.....	89.0	18.0	54.9	2.31
Central counties.....	85.0	15.0	53.9	2.67
Southern counties.....	88.0	21.0	56.5	3.19
State.....	89.0	15.0	55.1	2.73

Temperature.—The warmest days were the 23d, 24th, and 25th; and the

coldest the 2d, 3d, 4th, 5th, and 8th. At La Grange temperature was below 32° on eight days and above 70° on eleven; at Indianapolis, eight and fourteen, respectively; at Degonia, one and fifteen, respectively. The mean for the month was above normal 5°.1 at Logansport; 3°.4 at Spiceland; 1°.9 at Indianapolis; 3°.2 at Connersville; 1°.0 at Maury; 3°.0 at Sunman; 3°.3 at Worthington; 1°.1 at Vevay; 1°.5 at Blue Lick; and for the state the mean was higher 3° than in 1883; 5° than in 1884; 4° than in 1885; and 3° than the four-year normal. State range, 75°; average station, 58°; greatest, 64°, at Maury and Guilford; least, 46°, at Fillmore. Highest station mean, 59°; at Salem; lowest, 50°; at Maury. The mean at La Grange was 5° lower than at Degonia; the mean for the centre is 1° lower than for the north and 2° lower than for the south. Highest reading, 83°, at Miami; lowest, 15°, at Maury; average of highest, 83°; of lowest, 25°.

Precipitation (inches).—The precipitation was generally below normal, with, however, a slight excess in south-centre, and was well distributed through the month and over the state, ranging from an aggregate of 14.87 (at twenty-eight stations) on the 11th to 0.01 or less on the 8th, 9th, 18th, 22d, 25th, 28th, and from 4.20 at Marengo to 1.20 at Miami, as reported. The snowfall was greatly in excess of normal, and ranged from 14.0 at Farmland to 0.4 at Degonia. The days of greatest precipitation were the 6th (aggregate 12.44), 11th (14.87), 15th (9.36), 26th (8.41), 29th (11.74). Precipitation below normal 2.15 at Logansport; 0.99 at Spiceland; 0.54 at Indianapolis; 0.99 at Worthington; 0.94 at Vevay; 0.69 at Blue Lick; for state, 0.65; above, 0.44 at Connersville; 0.18 at Maury; 0.60 at Sunman. Greatest reported in one day, 1.79, at Salem, on the 11th.

Weather.—At ten stations, averaged, nine days were clear, ten fair, eleven cloudy, and 0.01 or more precipitation fell on thirteen. The first third of the month was cold, with snow on the 1st, 2d, 3d, 4th, 5th, 6th (very heavy and general), 7th, frost at one or more stations every day; the remainder of the month warm, with thunder-storms on the 12th (north), 13th, 15th (general), 16th, 17th, 20th, 23d (north), 24th (centre), 26th (general), 27th (south), 29th (centre and south). Solar halos are reported on the 10th, 20th, 22d, 23d, 24th; lunar on the 8th, 9th, 17th, 18th, 22d, 24th, and a rainbow at Jeffersonville on the 13th.

The following summary and remarks are taken from the April, 1886, report of the "Indiana Weather Service," under direction of Prof. H. A. Huston, of Purdue University, Lafayette:

Districts.	Temperature.			Average precipitation.
	Highest.	Lowest.	Monthly means.	
Northern counties	59.0	23.0	55.6	2.03
Central counties	56.0	15.0	53.7	2.67
Southern counties	58.0	27.0	55.8	3.14
State	59.0	15.0	55.0	2.61

The mean temperature of the state for April was 3° above the mean of April for the past four years; 2.6 above the mean of fifteen years at Indianapolis; 2° above the mean of thirty-one years at Logansport; 0° above the mean of twenty-one years at Vevay; 5° above the mean of six years at Maury; 5° above the mean of thirty-two years at Spiceland; 0° above the mean of eight years at Blue Lick; 0° above the mean of four years at Worthington; 4° above the mean of seven years at Connersville; 5° above the mean of seven years at Lafayette and about 2° above the normal. The mean temperature at all stations was above the normal, the amounts ranging from 0° to 4°.

The mean precipitation for the state was 0.71 inch below the mean for April in the past four years; 1.02 inches below the mean of fifteen years at Indianapolis; 0.57 inch below the mean of thirty-one years at Logansport; 0.88 inch below the mean of twenty-one years at Vevay; 1.21 inches below the mean of twenty-seven years at Spiceland; 1.07 inches below the mean of four years at Blue Lick; 0.85 inch below the mean of four years at Worthington; 0.81 inch below the mean of four years at Connersville; 0.72 inch below the mean of seven years at Lafayette and about 1.00 inch below the normal amount for April. The precipitation was unevenly distributed over the state, being greatest in the southern counties; but all stations show a deficiency, the amounts ranging from 0.50 to 1.62 inches.

The snowfall was abnormal in both amount and distribution, being heaviest in central and southern counties.

Nine solar halos were reported on seven dates, seven lunar halos on six dates, and two lunar coronæ on different dates.

The following is an extract from the April, 1886, report of the "Missouri Weather Service," under direction of Prof. Francis E. Nipher, Washington University, Saint Louis:

April, 1886, has had a temperature of 58° at the central station, which is two degrees above the normal temperature. The extremes were 28° on the 5th, and 82° on the 24th. The temperature fell to or below the freezing point four times, the last being on the 5th. After the 8th the temperature did not fall below 45°. In former years the temperature has fallen to 32° as late as April 30 (in 1877).

The rainfall, 2.50 inches, is 1.2 inches below the normal rainfall.

In the state the lowest temperature observed was 19°, at Oregon; the highest was 88°, at Greenfield and Miami. The least rainfall reported was 0.98, at Kirksville; the greatest, 6.64, at Cairo, Illinois.

The most marked event of the month was the tornado in Holt and Nodaway counties on the 14th. The storm began about 19.30 (7.30 p. m.) doing its first damage at the farm of H. W. Bissett (whose house was destroyed last year, but who escaped with slight damage), in the northeast corner of section 7, township 62, range 38° west. It passed on through the extreme southeast corner of Atchison county into Nodaway county and did its last serious damage at the farm of A. Barber near the northeast corner of section 35, township 64, range 38° west. The length of this track is over ten miles. The storm, however, passed on passing between Skidmore and Quitmann. According to information furnished by Wm. Kaucher and R. Van Buskirk, five persons were killed, four probably injured fatally, and five were otherwise wounded. Fifteen houses were destroyed. As is usual, many wonderful escapes occurred, many whole families having been saved from destruction by the "tornado cave."

Mr. R. Van Buskirk further reports a heavy hail storm on the 15th, five miles west of Savannah, the hail lying six inches deep on the ground. He reports a very favorable outlook for wheat, corn, and fruit of all kinds.

Glasgow reports a fine prospect for fruit excepting peaches which are all killed. Wheat and pasture excellent. Corn being planted.

The following is an extract from the April, 1886, report of the "Nebraska Weather Service," under direction of Prof. Goodwin D. Swezey, of Doane College, Crete:

Like the month of March, April was chiefly noteworthy for its unusual fall of snow. Temperature, precipitation, and nearly every other feature of the weather were nearly normal.

Comparison of past Aprils.

The table shows the mean temperature, the noon temperature, and the number of days below 32° for the past nine Aprils in southeastern Nebraska; they are found by averaging the numbers reported at the different stations. It also shows the highest temperature and the lowest recorded anywhere in the state by standard self-registering thermometers:

April.	Mean temperature.	Noon temperature.	Average No. of days below 32°.	Highest temperature.	Lowest temperature.
1876	53.0	64.3	4.4	82.0	34.0
1879	52.0	61.1	3.5	80.0	13.0
1880	51.3	64.4	5.2	91.0	20.0
1881	45.1	54.0	9.8	81.0	6.0
1882	51.4	59.4	3.9	87.0	25.0
1883	52.3	60.4	3.2	95.0	29.0
1884	49.4	53.5	10.2	80.6	32.0
1885	49.2	55.2	4.8	84.0	19.8
1886	50.4	59.5	6.7	84.6	16.2

The following table shows the precipitation or depth in inches of rain and melted snow or hail, the number of days on which it fell, and the number of cloudy and clear days. Days are counted cloudy when the sky is four-fifths overcast; clear when less than one-third. The last column shows the number of thunder-storms:

April.	Precipitation.	Days of precipitation.	Cloudy days.	Clear days.	Thunder.
	Inches.				
1876	2.42	6.2	6.4	5.2	3.6
1879	3.11	7.4	5.4	12.6	1.9
1880	0.82	2.3	2.6	17.0	1.6
1881	2.91	7.4	6.8	9.1	3.5
1882	4.80	7.3	9.2	8.7	3.9
1883	2.43	8.0	5.2	9.8	2.3
1884	2.91	7.4	10.0	7.5	2.8
1885	4.29	10.1	7.8	9.0	3.6
1886	2.78	9.7	7.7	9.7	3.5

The average rain for the different sections of the state for April, 1886, is as follows:

Northeast section (one station), 2.40 inches; north-middle (one station), 3.25 inches; west (one station), 1.83 inches; south-middle (two stations), 2.56 inches; southeast (covering essentially what has heretofore been the "whole state" as far as reporting), 2.78 inches; state average by sections, 2.59 inches.

The "New England Meteorological Society," under direction of Prof. Winslow Upton, furnishes the following summary for April, 1886:

Reports for the month were received from one hundred and forty-three observers:

General conditions.—The month was warm and pleasant, with an unusual number of fair days, an absence of severe frosts, and with but few high winds. Beginning with rain, as the depression which caused the heavy rains of March 31st moved north of the district, it was followed by partly cloudy weather and local rains until the 6th, when a cyclonic storm approached from the southeast, attended by high winds and heavy rain or snow on the 6th and 7th. This was the only important barometric depression of the month. After the 8th a suc-

cession of fair days followed until the end of the month, interrupted by local showers on the 13th and 24-28th. The pressure remained above the average from the 9th to the 23d, and was especially high from the 11th to the 20th. The temperature rose after the 17th, and on the 24th values above 80° were recorded at many stations. The rest of the month was cooler. The average temperature of the month was about 4° above the average. The precipitation was small in the Northern States, but normal or a little above the average in the Southern. This difference was due to the irregularity in the distribution of the rain and snow on the 6-7th.

Special features.—The following deserve mention:

1. *The freshets on the 1st:* These occurred in the rivers of New Hampshire and Vermont especially, and resulted from the heavy rains of the closing days of March. More damage was done in some instances than in any other freshet since 1869.

2. *The storm of the 5-7th:* A depression from the Gulf, with pressure at the centre 29.4 inches, reached Delaware on the morning of the 6th. Very heavy rains and high winds accompanied it, and it gave promise of being a destructive storm; but on the 7th it greatly diminished in intensity as it passed northerly over Massachusetts and Vermont. Nearly all the rain and snow of the month fell in connection with this depression, the amount varying from 4 inches in New York, 2 to 3 inches in Connecticut and Rhode Island, 1.5 to 2.5 inches in Massachusetts, southern Vermont, New Hampshire, and Maine, to 0.5 inch in the extreme north. Considerable hail fell, and the trees were loaded with ice in high regions, as at Princeton and Norfolk, making the fourth destructive ice storm of the season.

3. *Thunder-storms:* These were three in number: First, 13th, 5 to 6 p. m., occurring at Albany, New York, Long Island, and at many stations in Connecticut. Second, 19th, in western Massachusetts, Vermont, New Hampshire, and Maine, the times of the thunder varying from 2.40 p. m. at Stratford, 4 p. m. at Amherst, to 5 p. m. at Bridgeton; but little rain fell. Third, 24th, 3-5 p. m., at a few stations in Connecticut, Rhode Island, and Massachusetts. Light rains were numerously reported. None of these storms were sufficiently well marked to be traced in detail.

Advance of the season.—The forwardness of the season, indicated in March by the early arrival of spring birds, is still further shown by the state of vegetation at the close of April. At Bridgeton grass was two weeks earlier than usual; at Charlotte the trees leafed thirteen days before the average date for nineteen years, and from every part of New England come similar reports.

Miscellaneous.—Auroras were generally observed on the 14th and 30th; also on the 1st at Gardiner, Chelsea, Amherst (10.30 p. m.), Provincetown (9.20 p. m.), New Haven; 2d, Mayfield; 4th, Parker's Ridge; 11th, Eastport, Gardiner, Mayfield; 12th, Chelsea (10 p. m.); 20th, Bar Harbor, Eastport, Gardiner, Kent's Hill, Mayfield; 29th, Eastport, Kent's Hill, Walpole.

The verification of weather signals at New Haven was 70 for temperature and 83 for weather, and at seventeen other stations, 90.2 for temperature and 78.8 for weather.

Solar halos of marked brilliancy were noted on various dates, especially at Brattleborough on the 5th.

The following summary is made from reports for April, 1886, furnished by Prof. B. F. Thomas, of the Ohio State University, Columbus, director of the "Ohio Meteorological Bureau," in advance of the regular monthly report:

State summary.

Temperature.—Mean, 53°.2; highest, 86°.0, at the Ohio State University, Columbus, on the 16th, 19th, 22d, 23d; lowest, 11°.0, at the same place, on the 8th; mean monthly range, 63°.4; greatest daily range, 44°.2, at Wauseon, on the 8th; least daily range, 2°.6, at Sandusky.

Precipitation.—Average monthly precipitation, 2.59 inches; greatest rainfall, 4.47 inches, at New Alexandria; least rainfall, 0.60 inch, at Salem.

Average number of days on which rain fell, 10.6; clear days, 11.2; fair days, 8.8; cloudy days, 10.0.

Prevailing direction of wind, south.

The following is an extract from the "Tennessee State Board of Health Bulletin," for April, 1886, prepared under the direction of J. D. Plunkett, M. D., President of the State Board of Health. The summary is prepared by Major H. C. Bate, in charge of the State Meteorological Service:

There were no very notable features during the month of April. The snow-fall about the 4-6th was the chief departure from the normal conditions.

The mean temperature for the month was 58°.3, about one degree below the mean for April, 1885, and 2°.6 above the corresponding period in 1884. The highest temperature, recorded on the 23d, was 89°, the same and about the same date as on the preceding year, and 3° above the maximum for April, 1884. The lowest temperature, recorded on the 6th, was 20°, 1° below the minimum of April, 1885, and 5° below that for the corresponding period in 1884. The mean of maximum temperatures was 88°.4, respectively 0°.8 and 3°.8 above the means of April, 1885 and 1884. The mean of minimum temperatures was 29°.6, respectively 0°.6 and 2°.5 below the means of April, 1885 and 1884.

The mean precipitation was 3.61 inches, 0.86 inch more than for the corresponding month of last year, 1.34 inches less than the mean for April, 1884.

Of this the eastern division received nearly four inches, the middle division received nearly three inches, and the western division received about four inches. The greatest rainfall occurred on the 5th, and was accompanied by snow. This fall was heaviest in the eastern and middle divisions. Most of the rains during the month were light showers. The greatest local daily rainfall was 2.76 inches on the 5th, reported from Knoxville. There were six days on which no rain was reported, viz., 1st, 8th, 19th, 22d, 23d, 24th.

Snow fell on the 4th, 5th, 6th, and 7th; that of the 5th was the heaviest. The greatest depth for month was 6.20 inches, reported from Austin.

Frosts were reported at different places on the 1st, 2d, 3d, 4th, 5th, 6th, 7th, 8th, 9th. Those of the 5th, 6th, 8th were killing frosts; the others generally light.

The almost unprecedented floods which prevailed during the first decade of the month, resulting from the excessive rainfall of the last days in March and the first days of April, did immense damage to farms along the rivers and smaller streams.

State summary.

Mean temperature, 58°.3; highest temperature, 89°.0, on the 22d, at Grief; lowest temperature, 20°.0, on the 6th, at Beach Grove and Riddleton; range of temperature, 69°.0; mean monthly range of temperature, 53°.8; greatest monthly range of temperature, 64°.0, at Beech Grove and Riddleton; least monthly range of temperature, 46°.0, at Covington; mean daily range of temperature, 16°.9; greatest daily range of temperature, 44°.0, on the 8th, at Hohenwald; least daily range of temperature, 2°.0, on the 5th, at Manchester, Riddleton, Florence Station, and Howell; on the 7th, at Careyville; on the 14th, at Trenton; on the 29th, at Jonesborough and Rogersville; mean of maximum temperature, 88°.4; mean of minimum temperature, 29°.6.

Mean depth of rainfall, 3.61 inches; mean daily rainfall, 0.12 inch; greatest rainfall, 6.25 inches, at Greeneville; least rainfall, 1.30 inches, at Fostoria; greatest local daily rainfall, 2.76 inches, on the 5th, at Knoxville; days of greatest rainfall, 4th, 5th, 27th, 28th; day of greatest rainfall, 5th.

Average number of days on which rain or snow fell, 11; average number of clear days, 9.8; average number of fair days, 9.8; average number of cloudy days, 10.4.

Mean depth of snowfall, 1.98 inches; greatest depth of snowfall, 6.20 inches, at Austin; days without precipitation (rain or snow), 8th, 19th, 22d, 23d, 24th.

Warmest days, 23d, 24th; coldest day, 6th.

Prevailing winds, south and southwest.

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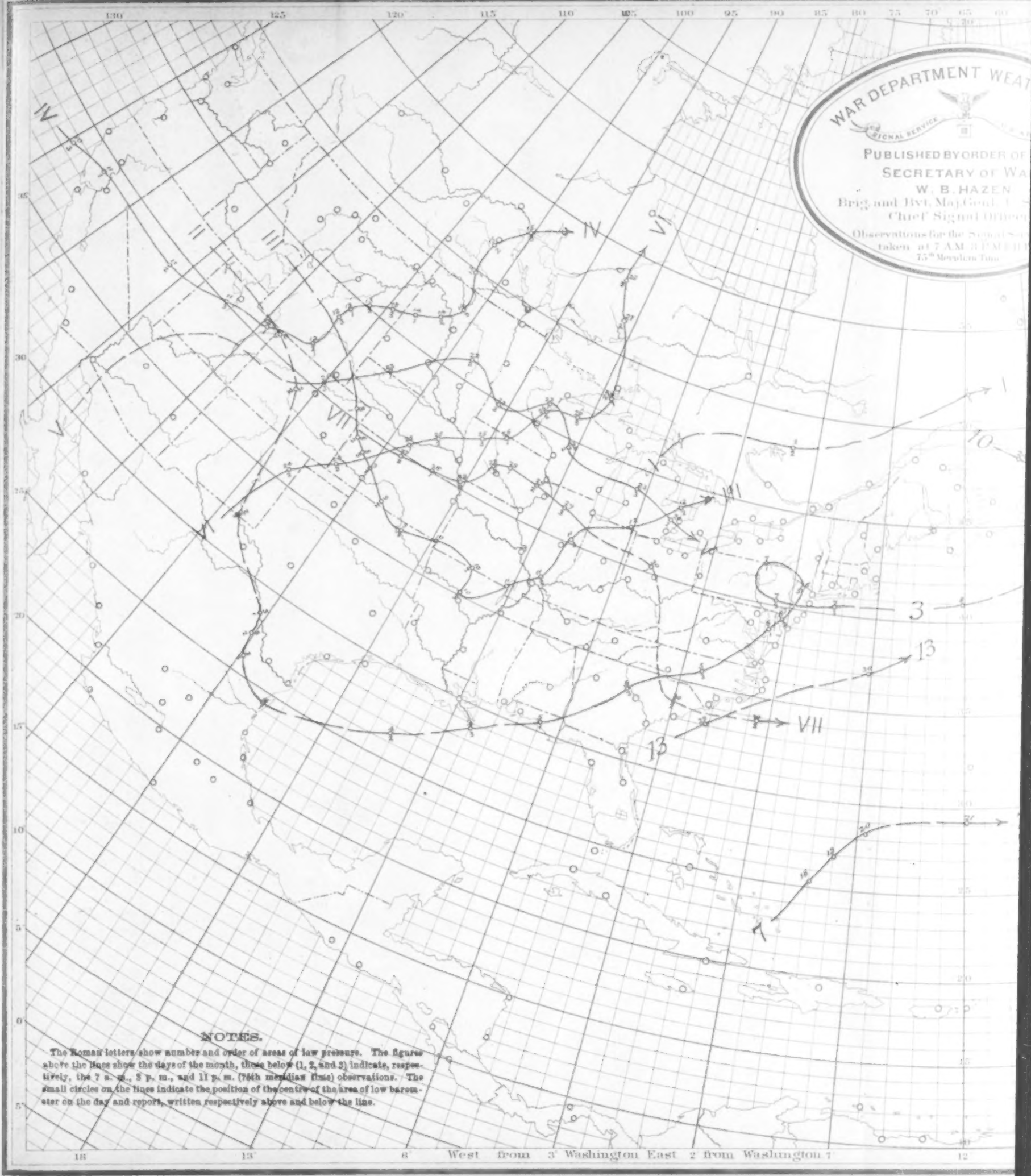
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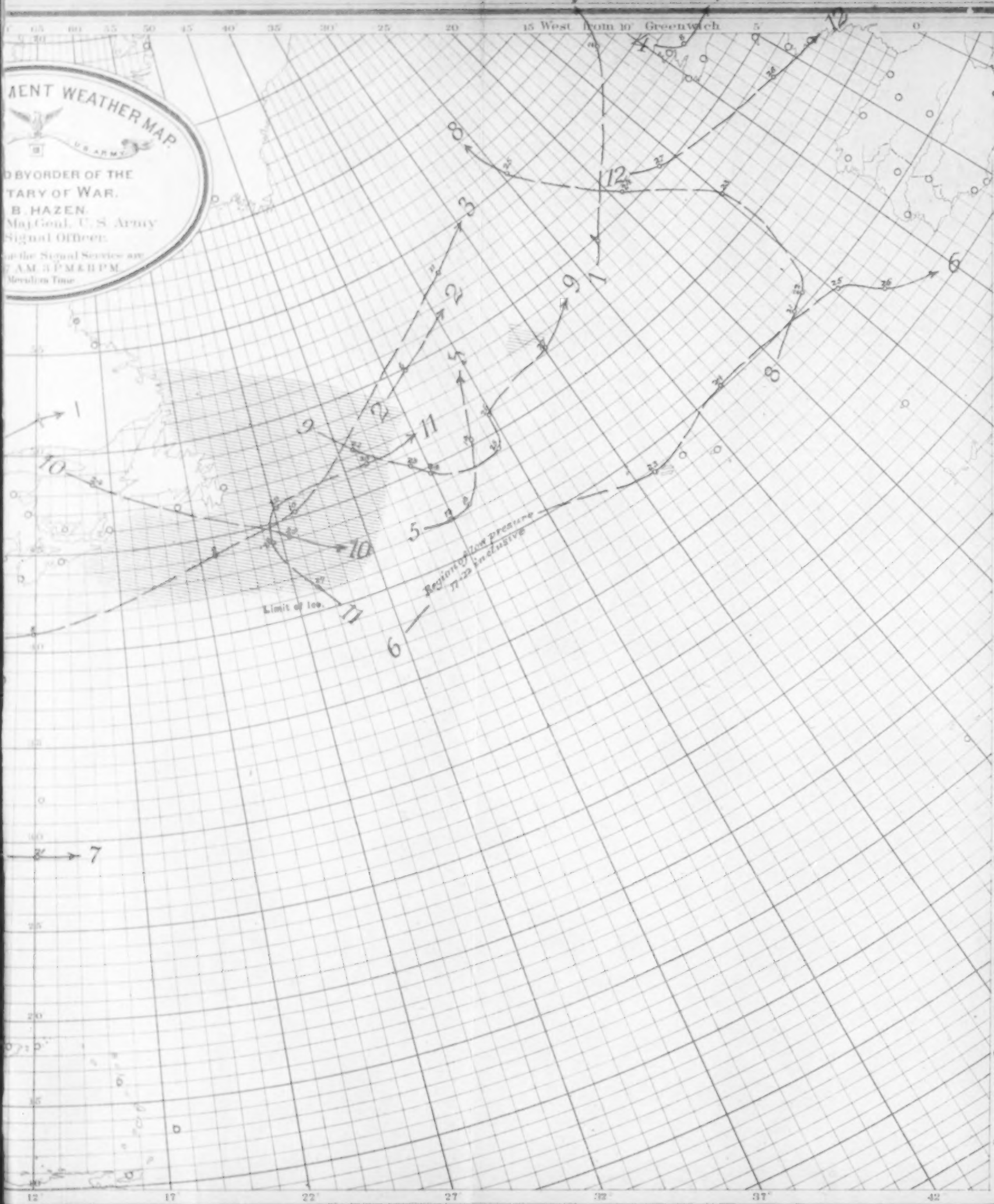
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Chart I. Tracks of Areas of Low

Form 106 G 1884.



as of Low Pressure. April, 1886,





Signal Office Lith.

Chart II. Isobars, Isotherms, and Winds, April, 1886.

Form 106 F.

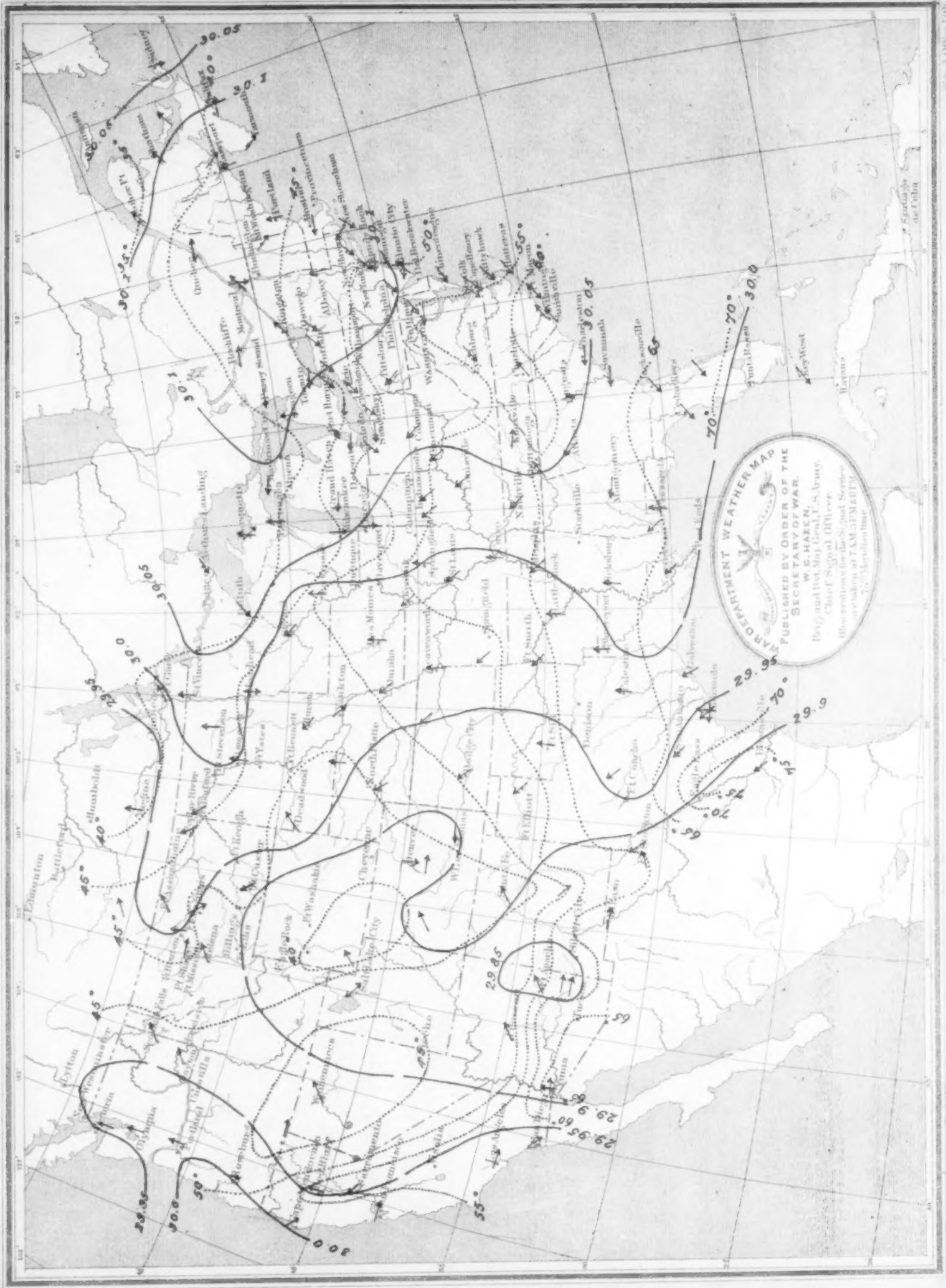
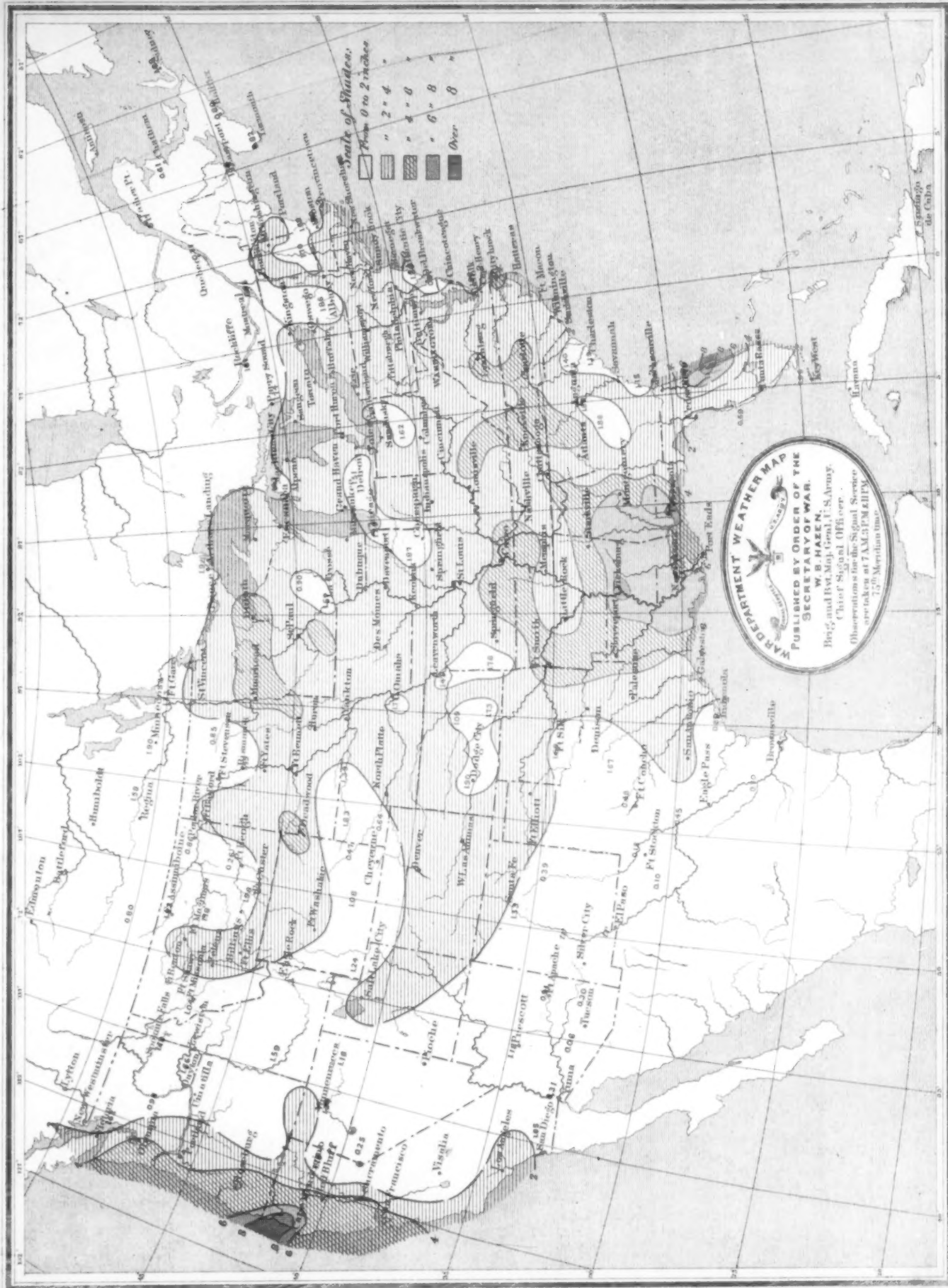




Chart III. Precipitation, April, 1886.

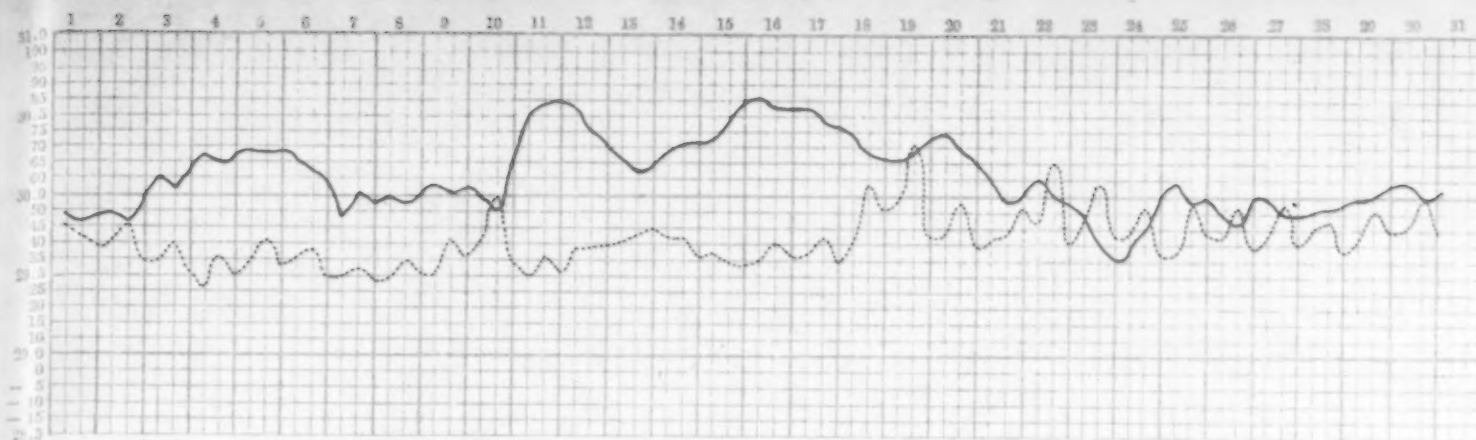


Form CMS-128

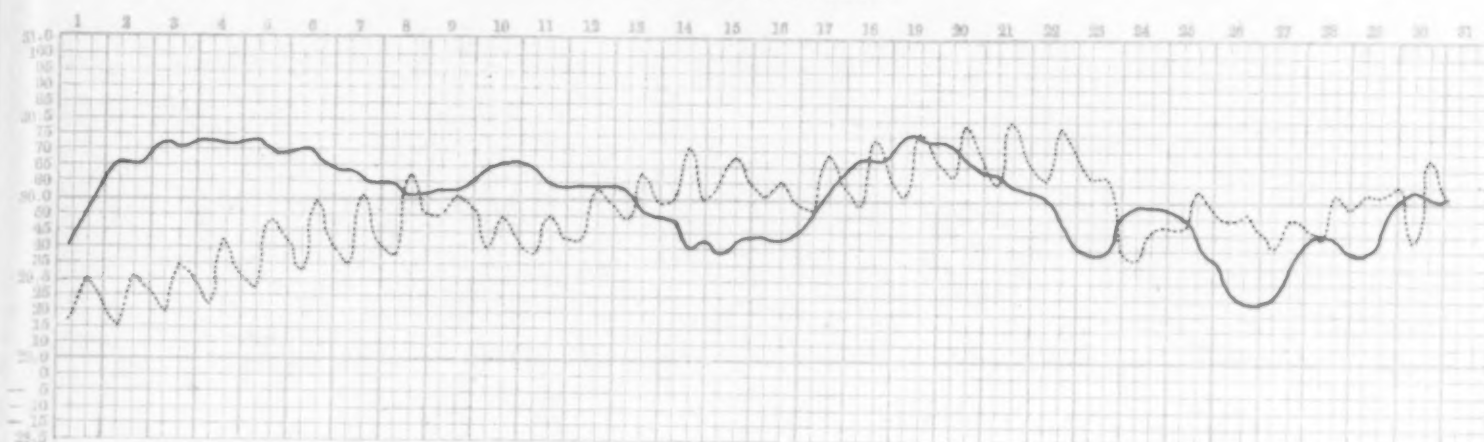


Chart V. Pressure (.....) and Temperature (——) Curves. April, 1886.

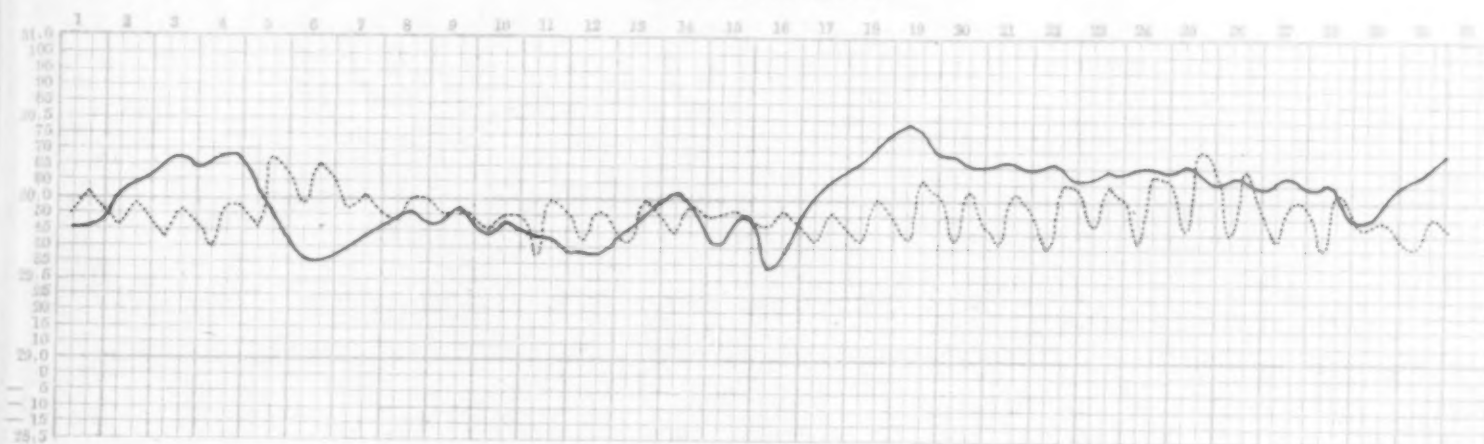
EASTPORT, ME.



SAINT PAUL, MINN.



PORTLAND, OREG.



NEW ORLEANS, LA.

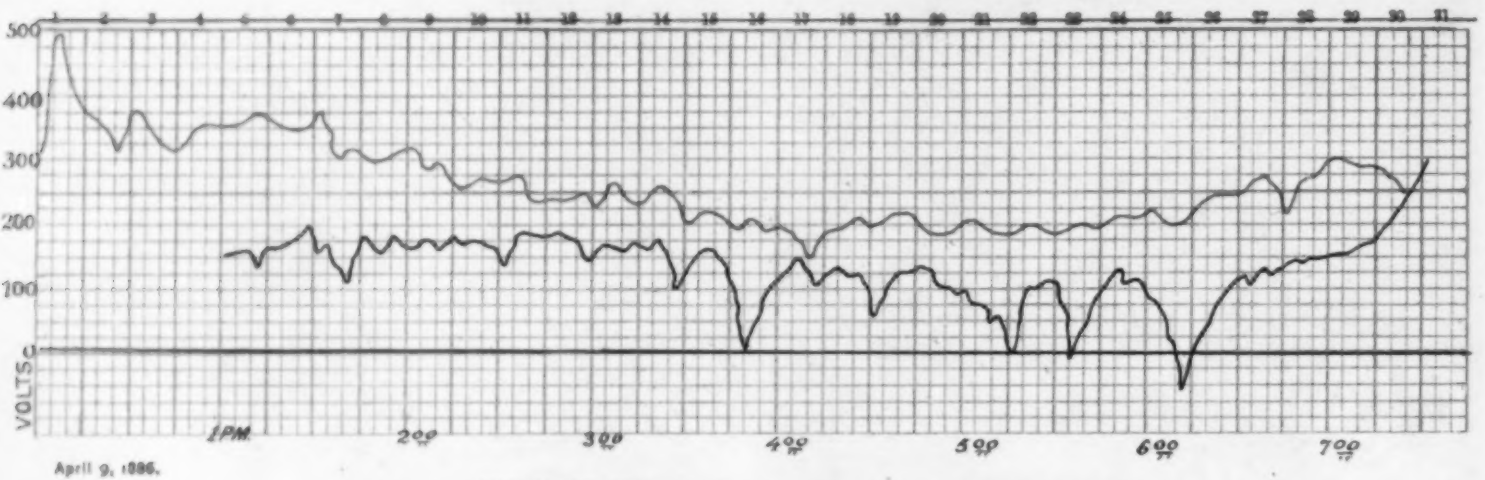


Chart VI. Curves showing Simultaneous Readings of Electrometer s.

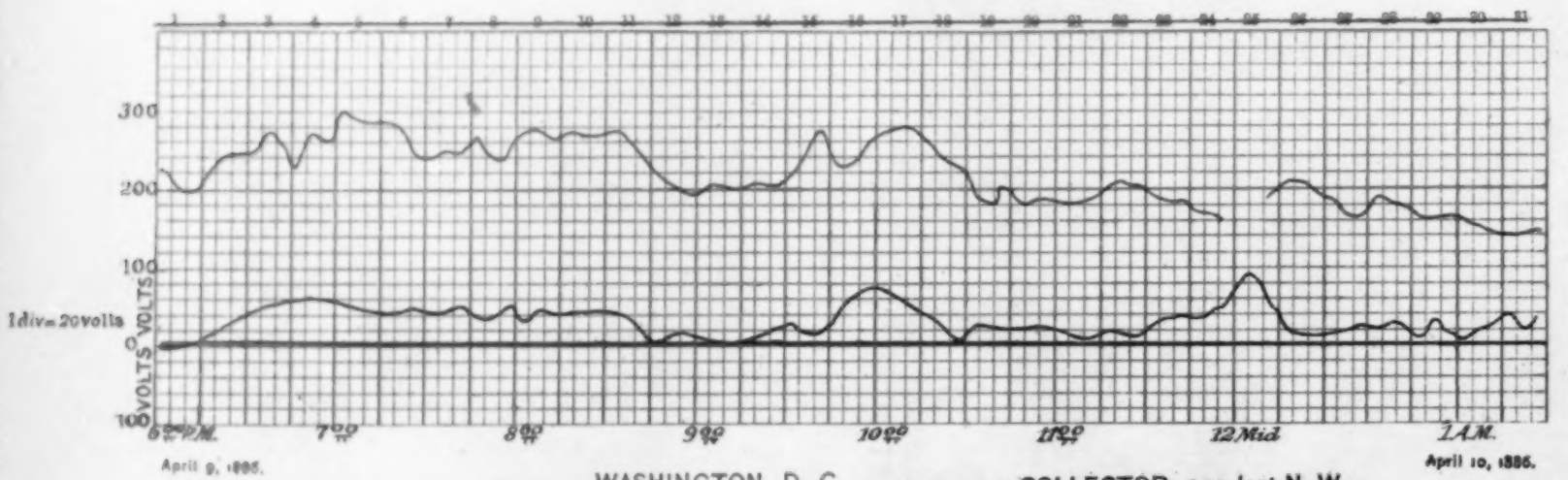
— WASHINGTON, D. C. — BALTIMORE, MD.



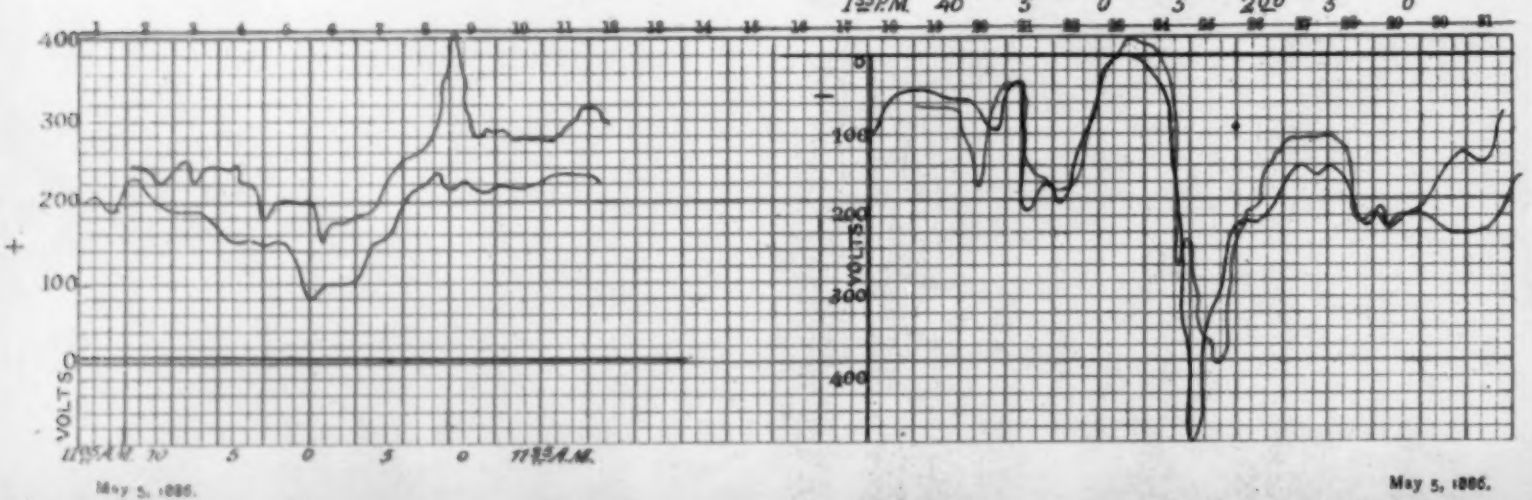
— WASHINGTON, D. C. — BALTIMORE, MD.



— WASHINGTON, D. C. — COLUMBUS, OHIO.



— WASHINGTON, D. C. — COLLECTOR, 300 feet N. W.



May 5, 1886.

Observer and place of observation.	Observer and place of observation.	Observer and place of observation.	Observer and place of observation.
Adams, Effe, Logan, Iowa.	Dutton, Lieut. W. R., Dorset, Vt.	Kedzie, D. H., Midland, Tex.	Stunkard, L. E., East Brook, Pa.
Alexander, S., Birmingham, Mich.	Dunmore, Jr., Prof. T. H., Emporia, Kans.	Keesee, G. Pomeroy, Cooperstown, N. Y.	Stenker, Mrs. E. D., Snowville, Va.
Anderson, Dr. W. W., Stateburg, S. C.	Ellsworth, W. W., Hartford, Conn.	Kaufman, H. W., Quakertown, Pa.	Smyth, B. B., Topeka, Kans.
Altamier, J. M., Independence, Kans.	Elison, W. A., Statesville, N. C.	Lovewell, Prof. J. T., Topeka, Kans.	Stur, J. R., Summit, Va.
Adams, Dr. O. H., Vineland, N. J.	Eckstein, Rev. M., Conception, Mo.	Livermore, Chas. C., Fort Gatlin, Fla.	Sedgwick, H. F. J., Stratford, Vt.
Abbott, Dr. E. K., Salinas, Cal.	Ellis, John, Marquette, Nebr.	Lueps, Miss Anna, Manitowish, Wis.	Strong, S. H., Schenectady, N. Y.
Arends, Hiram, Groville, Cal.	Ewell, Dr. M. D., South Evanston, Ill.	Lincoln, A. T., Marion, Va.	Somersville, W. B., Birmingham, Ala.
Ayer, O. H., Oskaloosa, Iowa.	Fox, F. E., Fall Brook, Cal.	Loomis, J. C., Jeddah, Ind.	Samositz, Oscar, Austin, Tex.
Adams, A. H., Fort Meade, Fla.	Fox, G. W., Marietta, Cal.	Lay, Dr. F. H., Pueblo, Colo.	Shepard, E. M., Springfield, Mo.
Allen, J. B., Penrod, Ky.	Ford, H. C., El Dorado, Kans.	Luther, S. M., Garrettsville, Ohio.	Safford, A. T., Williamstown, Mass.
Anderson, Prof. J. T., Fayette, Mo.	Ferris, B. F., Sunman, Ind.	Ladshaw, Geo. E., Pacolet, S. C.	Sherman, W. B., Manchester, Iowa.
Blake, J. H., Blue Lake, Cal.	Friend, Chas. W., Carson City, Nev.	Lamb, Miss Bertha E., Sterling, Kans.	Staudenmeyer, Dr. L. R., Lincoln, N. C.
Bentley, David, Princeton, Cal.	Fleming, J., Readington, N. J.	Land, Prof. F. H., Colorado Springs, Colo.	Spilman, J. J., Pierce City, Mo.
Bryant, A. T., Yutan, Nebr.	Field, Thos. G., Parkersburg, W. Va.	Laughlin, D. L., Knightstown, Ind.	Swezey, Prof. G. D., Crete, Nebr.
Bisbee, Capt. Lewis, Buckfield, Me.	Ferguson, W., Puterson, N. J.	Lerch & Rice, Bethlehem, Pa.	Sacred Heart College, Prairie du Chien, Wis.
Boerner, Prof. Chas. G., Vevay, Ind.	Fernand, Prof. M. C., Orono, Me.	Lamar, T. J., Prattville, Ala.	Stalls, T. J., Paris, Tenn.
Boynton, John F., Syracuse, N. Y.	Frisk, John H., Warrenton, Mo.	Louder, R. T., Clarksburg, W. Va.	Snell, S. C., Amherst, Mass.
Bayerly, J. P., Spartanburg, S. C.	Foss, E. T., Hydesville, Cal.	Mackey, T. C., Gardiner, Oreg.	Smith, H. D., Monticello, Iowa.
Biennet, Geo., Bandon, Oreg.	Fuller, Edw. N., Tacoma, Wash. T.	Metcalf, Dr. J. G., Mendon, Mass.	Tilman, C. M., Mount Blanco, Tex.
Bell, Joseph, Franklin, Pa.	Gaillard, B. P., Dahlonga, Ga.	Memmlinger, E. R., Flat Rock, N. C.	Trembley, Dr. J. B., Oakland, Cal.
Brainerd, Dr. H. G., Independence, Iowa.	Gordon, Dr. G. G., Swartz Creek, Mich.	Morgan, L. Ray, Phillipsburg, Pa.	Todd, Prof. David P., Amherst, Mass.
Baker, Dr. Henry B., Lansing, Mich.	Gore, Prof. J. W., Chapel Hill, N. C.	Miller, H. D., Drifton, Pa.	Thornton, Prof. N., Geneseo, Ill.
Beall, Dr. R. L., Lenox, N. C.	Gibson, J. H., Salina, Kans.	McNeill, M., Princeton, N. J.	Teale, Rev. A. K., Blue Hill, Mass.
Brendel, Dr. Fred., Peoria, Ill.	Geddings, Dr. W. H., Alken, S. C.	Matzinger, Rev. P. F., Preston, Minn.	Truman, Geo. S., Genoa, Nebr.
Bartlett, E. B., Vermillion, N. Y.	Gates, W. B., Burlington, Vt.	Munn, A. M., Kalamazoo, Mich.	Terborg, J. L., Pekin, Ill.
Baldwin, A. L., Bethel, Conn.	Grathwohl, John, Blooming Grove, Pa.	McPherson, Wm., Ross Valley, Cal.	Turnbo, Silas C., Pro Tem, Mo.
Briggs, John, Albany, Oreg.	Gillingham, Milnor, Fallsington, Pa.	McDonogh Institute, McDonogh, Md.	Pillinghast, C. B., Albany, N. Y.
Betta, Prof. Arthur, Webster, Dak.	Gardner, H. H., Gardiner, Me.	McCready, Miss L. A., Fort Madison, Ia.	Underhill, Dr. C. B., Salida, Colo.
Brued, J. E., Embarras, Wis.	Gowey, H. D., North Lewisburg, Ohio.	Moore, C. R., Bird's Nest, Va.	Vail, Hugh D., Santa Barbara, Cal.
Boyd, Joseph, Oskaloosa, Iowa.	Green, Dr. Jesse C., West Chester, Pa.	Micklen, J. H., Variety Mills, Va.	Voegeli, Adolphus, Des Moines, Iowa.
Boles, Lieut. A. H., Hudson, Mich.	Gerrish, S. H., Sacramento, Cal.	McKenzie, Dr. M., Centerville, Mo.	Went, E. C., Frankfort, Ky.
Beane, T. J., McCombtown, N. J.	Gray, J. W., Stockham, Nebr.	Macrae, Collin, Kirkwood, S. C.	Washburn Observatory, Madison, Wis.
Barney, W., Stowe, Vt.	Goodwin, Wm., North Colebrook, Conn.	Meelan, Thos., Germantown, Pa.	Wild, Rev. E. P., Newport, Vt.
Blachly, C. P., Manhattan, Kans.	Gray, F. B., Yates Center, Kans.	Moore, Nathan, Grampan Hills, Pa.	Williams, Rev. C. F., Ashwood, Tenn.
Bridges, Q. A., Berlin Mills, N. H.	Gillingham, W., Acotink, Va.	Mikeell, Thos., Wauseon, Ohio.	Wing, Miss M. E., Charlotte, Vt.
Beecher, Chas., Wysox, Pa.	Garlick, Rev. Dr. J. R., Brington, Va.	Marshall, G., Cresco, Iowa.	West, Silas, Cornish, Me.
Bowman, Peter, Ruggles, Ohio.	Gray, Capt. A. W., Kenewick, Wash. T.	Kitchell, Dr. D. W., Harrisville, Mich.	Wylie, Wm., Mount Forest, Canada.
Cook, S. A., Milledgeville, Ga.	Gustin, M., Troy, Pa.	Moore, Dr. J. W., Easton, Pa.	Walton, J. P., Muscatine, Iowa.
Cowgill, Prof. E. R., Manhattan, Kans.	Henth, E. R., Wyandotte, Kans.	Motte, L. S., West Milton, Ohio.	Walt, S. E., Traverse City, Mich.
Cutler, J. L., Quito, Ga.	Harvard College Observatory, Cambridge, Mass.	Marshall, Gregory, Cresco, Iowa.	Woodstock College, Woodstock, Md.
Charbonnier, Prof. L. H., Athens, Ga.	Hammit, John W., College Hill, Ohio.	Nordberg, A., Richardson, Dak.	Wetmore, Edw. L., Tucson, Ariz.
Cassey, Geo., Auburn, N. Y.	Heaton, Isaac E., Fremont, Nebr.	Newbegin, John D., Anna, Ill.	Wolfe, John H., Wellington, Kans.
Crawford, E. A., Liberty Hill, La.	Hoskinson, R. M., Bainbridge Island, Wash. T.	Neal, Dr. J. C., Archer Fla.	West, Dr. Jos. O., Princeton, Mass.
Curtis, G. G., Fallston, Md.	Hyde, G. A., Cleveland, Ohio.	Olds, H. D., Cedar Rapids, Iowa.	Receiving Reservoir, D. C.
Cornell University, Ithaca, N. Y.	Haywood, John, Westerville, Ohio.	Owley, Dr. J. B., Jacksonborough, O.	Distributing " "
Cutting, Dr. Hiram A., Lunenburg, Vt.	Hartsler, J. A., Mottville, Mich.	Pearce, Thomas, Eola, Oreg.	Great Falls Reservoir, Md.
Crosier, Adam, Laconia, Ind.	Hall, J. B., Worcester, Mass.	Peelo, Capt. A., New Westminster, B. C.	Rock Creek Bridge, D. C.
Gaulkins, John S., Thornville, Mich.	Hager, Mrs. L. G., Terre Haute, Ind.	Partridge, J. M., North Volney, N. Y.	Weir's Bridge, N. H.
Cass, John J., Allison, Kans.	Howe, Prof. J. L., Richmond, Ky.	Purdue University, Lafayette, Ind.	Woodstock, N. H.
Cleveland, Dr. G. H., Pentwater, Mich.	Houghton Farm Experiment Station, Mountainville, N. Y.	Petersen, Dr. F., Comfort, Tex.	Wolffborough, N. H.
Carpenter, Dr. W. B., Leavenworth, K.	Heatwole, L. J., Dale Enterprise, Va.	Pendleton, A., Nicolaus, Cal.	Lake Village, N. H.
Christ, Jacob, Franklin, Wis.	Hazen, Rev. A., Deerfield, Mass.	Parrish, G. W., Ellensburg, Wash. T.	Bristol, N. H.
Cheney, Wm., Minneapolis, Minn.	Hamilton, W. H., Corsicana, Tex.	Postma, H. Y., Egg Harbor City, N. J.	Belmont, N. H.
Culver, G. E., Vermillion, Dak.	Hatch, A. H., Windsor, Ill.	Roeder, W. F., Zionsville, Pa.	Ashland, N. H.
Carter, Rev. Dr. W. H., Tallahassee, Fla.	Harris, W. C., Dover, N. J.	Rotch, A. L., Blue Hill Obs'y, Mass.	Willis, O. R., A. M., Ph. D., White Plains, N. Y.
Comstock, Prof. F. M., Le Roy, N. Y.	Hodge, Rev. F. B., Wilkesbarre, Pa.	Randall, E. H., Poultey, Vt.	Watters, Dr. Jas., Westmoreland, Kans.
Collin, Prof. A., Mount Vernon, Iowa.	Humphrey, Dr. L., Fairbury, Nebr.	Renfrew, H. N., Bancroft, Iowa.	Williams, Dr. A. C., Elk Falls, Kans.
Cummings, L. D., Palmyra, N. Y.	Harris, T. C., Raleigh, N. C.	Remington, C. V. E., Fall River, Mass.	Wigg, Dr. Geo., East Portland, Oreg.
Cooper, Dr. Geo. C., Manatee, Fla.	Hanson, Olof, Kendall Green, D. C.	Robertson, T. D., Rockford, Ill.	Wright, J. W. A., Greensborough, Ala.
Chubbs, Thos. H., Post Mills, Vt.	Hunter, Dr. T. C., Napoleon, Ohio.	Rogers, F. M., Luling, La.	Whitmore, J. E., Gallinas Spring, N. Mex.
Cole, Seward, Cabuenga, Cal.	Hall, Chas. C., Dudley, Mass.	Rorick, R. H., La Grange, Ind.	Wadsworth, Dr. J. L. R., Collinsville, Ill.
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Childs, W. H., Brattleborough, Vt.	Hurlin, Rev. Wm., Antrim, N. H.	Runge, C., New Ulm, Tex.	Williams, Dr. A. C., Elk Falls, Kans.
Cochran, Wm. P., Wakefield, Kans.	Heim, Thos. B., Logansport, Ind.	Richardson, C. F., Beverly, N. J.	Watson, Evan, Fort Scott, Kans.
Colton, Prof. G. H., Hiram, Ohio.	James, John W., Marengo, Ill.	Starr, Prof. F. Cedar Rapids, Iowa.	White, Rev. J. H., Merritt's Island, Fla.
Coffee, Wm. K., Carthage, Mo.	Jones, Dr. E. U., Taunton, Mass.	Shaw, E., Minnescent, Kans.	Whitney, Chas. E., Humphrey, N. Y.
Chandler, Dr. W. J., South Orange, N. J.	Jackson Company, Nashua, N. H.	Strong, W. C., Kent's Hill, Me.	Wilson, W. T., Clayton, N. J.
Colton, Dr. D. B., Portsmouth, Ohio.	Jordan, Dr. M. D. L., Milan, Tenn.	Sanders, T. B., Susanville, Cal.	Wood, Joseph, Bar Harbor, Me.
Calhoun, P. B., Austin, Tenn.	Jones, Ira B., Neillville, Wis.	Simmons, Prof. W. G., Wake Forest, N. C.	Woody, Rev. C. A., Pendleton, Oreg.
Chapin, Adams, Peway, Cal.	Jones, F. M., Puerto de Luna, N. Mex.	Shriver, E. T., Cumberland, Md.	Wearmouth, J., University of Virginia, Va.
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Dazey, J. B., Charleston, Ill.	Knapp, J. G., Limona, Fla.	Scott, Thos. G., Forsyth, Ga.	Wedge, J. C., Fond du Lac, Wis.
Dechant, W. H., Mahanoy Plane, Pa.	Keesee, G. Pomeroy, Cooperstown, N. Y.	Stucky, Dr. C. T., Helvetia, W. Va.	Yetter, Wm. G., Catawissa, Pa.
Dow, Roswell, Sycamore, Ill.	Kuhne, F. W., Fort Wayne, Ind.	Slade, Ellis A., Somerset, Mass.	Yates, T. P., Factoryville, N. Y.
Deming, H. D., Wellsborough, Pa.	King, W. R., Yellow Springs, Ohio.	Shriver, Howard, Wytheville, Va.	Young, Geo. R., Penn Yan, N. Y.
Dozier, Wm., Mattoon, Ill.		Sonedecker, Rev. T. H., Fostoria, Ohio.	
Dewhurst, Rev. E., Voluntown, Conn.			
Day, Theodore, Dryberry, Pa.			
Dawson, Wm., Bloomland, Ind.			
Davis, W. O., Springington, Ill.			

Military posts from which meteorological reports were received, through the Surgeon General of the Army, in time to be used in the preparation of the Monthly Weather Review for April, 1886.

Alcatraz Island, Cal.	Clark, Fort, Tex.	Keogh, Fort, Mont.	McHenry, Fort, Md.	Riley, Fort, Kans.	Supply, Fort, Ind. T.
Angel Island, Cal.	Columbus, Fort, N. Y. H.	Lowell, Fort, Ariz.	Mount Vernon H'ks, Als.	Ringgold, Fort, Tex.	Totten, Fort, Dak.
Assinaboine, Fort, Mont.	Concho, Fort, Texas.	Laramie, Fort, Wyo.	Meade, Fort, Dak.	Snelling, Fort, Minn.	Townsend, Ft., Wash. T.
A. Lincoln, Fort, Dak.	David's Island, N. Y. H.	Lewis, Fort, Colo.	Niagara, Fort, N. Y.	Saint Augustine, Fort, Fla.	Union, Fort, N. Mex.
Bentley Barracks, Cal.	Ellis, Fort, Mont.	McIntosh, Fort, Tex.	Niourara, Fort, Nebr. [Cal.	Sully, Fort, Dak.	Verde, Fort, Ariz.
Bidwell, Fort, Cal.	Fred Steele, Fort, Wyo.	Missoula, Fort, Mont.	Presidio of San Francisco	Sisseton, Fort, Dak.	Washakie, Fort, Wyo.
Brady, Fort, Mich.	Gaston, Fort, Cal.	Mission, Fort, Cal.	Plattsburg Barracks, N. Y.	Shaw, Fort, Mont.	Wingate, Fort, N. Mex.
Bridge, Fort, Wyo.	Halleck, Fort, Nev.	Madison Barracks, N. Y.	Pembina, Fort, Dak.	Spokane, Fort, Wash. T.	West Point, N. Y.
Bayard, Fort, N. Mex.	Hays, Fort, Kans.	McDermitt, Fort, Nev.	Randall, Fort, Dak.	Selden, Fort, Nebr.	Walla Walla, Ft., Wash. T.
Bolsé, Fort, Idaho.	Huachuca, Fort, Ariz.	Monroe, Fort, Va.	Robinson, Fort, Nebr.	Sidney, Fort, Nebr.	Yates, Fort, Dak.
Cour d'Alene, Ft., Idaho.	Klamath, Fort, Oreg.	McDowell, Fort, Ariz.	Beno, Fort, Ind. T.		

State weather services from which meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for April, 1886.

Alabama State Weather Service, under direction of Prof. P. H. Mell, Jr., Auburn, Alabama.
 Colorado Weather Service, under direction of Prof. F. H. Loud, Colorado Springs, Colorado.
 Georgia Weather Service, under direction of Hon. J. T. Henderson, Commissioner of Agriculture, Atlanta, Georgia.
 Illinois Weather Service, under direction of Mr. Charles F. Mills, Springfield, Illinois.
 Indiana State Weather Service, under direction of Prof. H. A. Huston, La Fayette, Indiana.
 Indiana State Weather Service, under direction of Prof. W. H. Ragan, De Pauw University, Greencastle, Indiana.
 Minnesota State Weather Service, under direction of Prof. W. W. Payne, Northfield, Minnesota.
 Missouri State Weather Service, under direction of Prof. Francis E. Nipher, Saint Louis, Missouri.
 Nebraska Weather Service, under direction of Prof. Goodwin D. Swezey, Crete, Nebraska.
 New England Meteorological Society, Prof. Winslow Upson of Providence, R. I. President; Prof. W. M. Davis, of Cambridge, Mass. Secretary.
 Ohio State Weather Service, under direction of Prof. B. F. Thomas, of the Ohio State University, Columbus, Ohio.
 Tennessee State Weather Service, under direction of Major H. C. Bate, Nashville, Tennessee.
 Data have also been used from meteorological records of the Central Pacific and Southern Pacific railway companies.

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